

September 15, 2015

REMEDIAL INVESTIGATION WORK PLAN

**1022 Old Country Road
Plainview, New York 11803
Site Number 130201**

Prepared for

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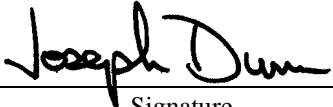
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CERTIFICATION

I, Joseph Duminuco, certify that I am currently a Qualified Environmental Professional as defined in 6 NYCRR Part 375 and that this Remedial Investigation Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

<u>Joseph D. Duminuco</u> Name	<u>September 14, 2015</u> Date	<u></u> Signature
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LIST OF ACRONYMS

µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
1,2 DCE	cis-1,2-dichloroethene
AOCs	.....	Areas of Concern
ASP	.....	Analytical Services Protocol (NYSDEC)
AWQSGVs	.....	Ambient Water Quality Standards and Guidance Values
bgs	.....	Below Ground Surface
CAMP	.....	Community Air Monitoring Plan
CERCLA	.....	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	.....	Contract Laboratory Protocol
CVOCs	.....	Chlorinated Volatile Organic Compounds
DER-10	.....	NYSDEC DER-10 Technical Guidance for Site Investigation and Remediation
DO	.....	Dissolved Oxygen
DUSR	.....	Data Usability Summary Report
EA	.....	Exposure Assessment
ELAP	.....	Environmental Laboratory Approval Program
ESA	.....	Environmental Site Assessment
FSP	.....	Field Sampling Plan
HASP	.....	Health and Safety Plan
mg/L	.....	Milligrams per liter
MW	.....	Monitoring Well
NTUs	.....	Nephelometric Turbidity Units
NYCRR	.....	New York Codes, Rules, and Regulations
NYSDEC	.....	New York State Department of Environmental Conservation
NYSDOH	.....	New York State Department of Health
ORP	.....	Oxidation – Reduction Potential
PID	.....	Photo Ionization Detector
PPE	.....	Personal Protective Equipment
PVC	.....	Polyvinyl Chloride
QA	.....	Quality Assurance
QAPP	.....	Quality Assurance Project Plan
QC	.....	Quality Control

LIST OF ACRONYMS (Continued)

RWPRemedial Work Plan
RI.....Remedial Investigation
RIWP.....Remedial Investigation Work Plan
SB.....Soil Boring
SCOsSoil Cleanup Objectives
SRISupplemental Remedial Investigation
SVOCsSemivolatile Organic Compounds
TAL.....Target Analyte List
TCL.....Target Compound List
TWATotal Weighted Average
USEPAUnited States Environmental Protection Agency
USGSUnited States Geological Survey
VOCs.....Volatile Organic Compounds

1.0 INTRODUCTION

Roux Associates, Inc. (Roux Associates), on behalf of Morton Village Realty Company, Inc., (Morton Village), has prepared this revised Remedial Investigation Work Plan (RIWP) for the Morton Village Plaza property located at 998-1064 Old Country Road, Plainview, Nassau County, New York, 11803 (Site). This revised RIWP addresses comments provided by the New York State Department of Environmental Conservation (NYSDEC) in the Disapproval of the February 2015 Remedial Investigation Work Plan comment letter dated July 24, 2015. The Site consists of four buildings that are currently occupied by various retail stores. The focus of this RIWP is on the former Morton Village Cleaners, a/k/a Classic French Cleaners, (former Cleaners) tenant space (1022 Old Country Road – currently occupied by a Subway restaurant) and on an area (asphalt parking lot) immediately north of the former Cleaners tenant space. The former Cleaners tenant space and parking lot area are collectively referred to as, Area of Concern 1 (AOC-1). The Site is currently listed in the Registry of Inactive Hazardous Waste Disposal Sites in New York State as Site Number 130201 with a Classification “2” pursuant to Environmental Conservation Law (ECL) 27-1305. The Site location is shown on Figure 1. A detailed description of the Site is provided in Section 2 of this revised RIWP.

This revised RIWP is being submitted for NYSDEC review and approval. This revised RIWP has been developed in accordance with the DER-10 Technical Guidance for Site Investigation and Remediation (May 2010) issued by the NYSDEC. The purpose of the RI is to further determine the nature and extent of impacted soil and groundwater within AOC-1, locate the historical septic sanitary system associated with AOC-1 (potentially a continuing source area), evaluate soil vapor conditions, and generate sufficient data necessary to support the development of a Feasibility Study Work Plan (FSWP).

1.1 RI Work Plan Organization

This revised RIWP contains a background section (Section 2) describing the Site, its history, and results of previous environmental investigations; a section defining the objectives and scope of the RI (Section 3); and Sections 4 and 5 that describe various project operations plans (e.g., Quality Assurance/Quality Control Plan, Health and Safety Plan). Reporting requirements and the project schedule are discussed in Section 6. Additionally, tables are provided that summarize all

previously collected environmental quality data. Previous sampling locations are presented on Figure 2. A map of the proposed sampling locations is presented on Figure 3.

1.2 Project Team Contact Information

Roux Associates' Principal-In-Charge for this Site will be Joseph Duminuco, Principal Hydrogeologist and Vice President. Mr. Duminuco is based at Roux Associates' Islandia, New York headquarters office and can be reached at (631) 232-2600. Jeff Wills will be the Project Manager, and will be responsible for day-to-day management of the project, including preparation of work plans, and scoping and directing field activities.

The contact for the Property Owner is:

John Patrick Curran, Esq.
Sive Paget & Riesel P.C.
460 Park Avenue
New York, New York 10022

At this time, the following subcontractors have been selected for this project:

- Drilling: Aquifer Drilling and Testing, Inc., Mineola, New York
- Analytical: Alpha Analytical, Westborough, Massachusetts

Other subcontracted services have not yet been selected. This information will be provided to NYSDEC following contractor selection.

2.0 BACKGROUND

This section provides pertinent background information, including a description of the Site and its setting, the known history of the Site, and the results of previous environmental investigation work conducted at the Site.

2.1 Site Description and Setting

Property Location	
Property Name:	Morton Village Plaza
Property Description:	The property is occupied by Morton Village Shopping Center, which consists of four buildings situated on four adjacent lots (Lots 10, 86, 88 and 89). The on-Site buildings are currently occupied by various professional businesses, retail stores, restaurants and a grocery store. The property is bordered by Knowles Street to the north, Old Country Road to the south, Lester Place to the east and Rex Place to the west.
Property Address:	998-1064 Old Country Road
Property Town, County, State:	Plainview, Nassau County, New York
Property Tax Identification:	Block 555 Lots 10, 86, 88 and 89
Property Topographic Quadrangle:	USGS Huntington Quadrangle, New York (1979)
Nearest Intersection:	Rex Place and Old Country Road
Area Description:	The area surrounding the Site is used mainly for residential purposes. Surrounding properties to the north, east and west are all residential properties. To the south of the Site, there are both residential properties as well as the Plainview-Old Bethpage Public Library.
Current Site Zoning:	Commercial-Use, 452.14 - Area/Neighborhood Shopping Center
Property Acreage:	9.936 acres
Property Shape:	Rectangular
Property Use:	The property is currently occupied by various professional businesses, retail stores, restaurants and a grocery store.

2.1.1 Site Operations

The Site is currently occupied by various professional businesses, retail stores, restaurants and a grocery store. The former Cleaners tenant space within AOC-1 is currently occupied by a Subway restaurant.

2.1.2 Utilities

The following companies and municipalities currently provide utility services to the Site:

Utility	Provider
Electricity	PSEG
Natural Gas	PSEG
Sanitary/Storm Sewerage	Nassau County
Potable Water	Plainview Water District

2.1.3 Topography/Hydrogeology

The property location is shown on the 1979 USGS Topographic Map of Huntington, New York. The surface elevation of the property is approximately 145 feet above mean sea level. Topography of the property slopes slightly to the south.

Groundwater was encountered at approximately 70 feet below ground surface (ft-bgs) during previous environmental investigations conducted by Leggette, Brashears & Graham, Inc. (LBG) and HRP Associates, Inc. (HRP). Based on previous environmental investigations conducted by LBG and HRP, groundwater beneath the Site flows to the south.

2.1.4 Wetland Areas and Surface Water Bodies

There are no identified wetlands on or adjacent to the Site. There are no surface water bodies on or adjacent to the Site. The Long Island Sound is approximately 7 miles north of the Site.

2.1.5 Soils

According to the USGS, soils in the area of the Site are classified as Urban Land (Ug). Ug consists of areas where at least 80-85 percent of the surface is covered by asphalt, concrete, or other impervious building materials. Based on Soil Conservation Service STATSGO data, native soils beneath the Site and the surrounding area are listed as: Surficial Soils (fine sandy loam, loam,

loamy sand, silt loam and sand); Shallow Soils (silt loam); and Deeper Soils (sandy loam, gravelly – coarse sand, and coarse sand). Based on the previous investigations, described below, the soil beneath the Site consists primarily of fine to medium sand with varying amounts of silt and trace gravel.

2.1.6 Underlying Formation

The Site is located on the southeastern portion of Nassau County, New York. Based on previous investigations, the soil beneath the Site consists of sand with varying amounts of silt and gravel. The rock stratigraphic unit beneath the Site consists of Cenozoic, Quaternary rock and is categorized as a Stratified Sequence (USGS, 1994).

2.1.7 Neighboring Properties

A review of neighboring properties from the Site and from public thoroughfares, and research of available information regarding the neighboring properties, was performed to identify evidence of environmental concerns that could adversely impact the Site. The Site is located in a mixed-use commercial and residential area of Plainview, Nassau County, New York. Based on the Environmental Site Assessment Phase I report prepared by LBG, a Gas Station historically occupied the property (Section 12, Block 555, Lot 6) adjacent to the southeast corner of the Site.

Direction	Operations
North	Residential Properties
East	Residential Properties
West	Residential Properties
South	Residential Properties and Plainview-Old Bethpage Public Library

2.2 Site History

The following summary of Site history was based on a Phase I Environmental Site Assessment performed by LBG in February 2009.

The property was previously used for agricultural purposes until developed as a shopping center in 1956. The property has been improved with commercial developments and past commercial occupants included a dry cleaning facility (i.e., AOC-1) from the late 1950’s through 2007.

Previous investigations (soil, groundwater, and vapor sampling) performed at the Site from 2006 to 2011 identified petroleum-related compounds and chlorinated compounds in the soil and soil vapor and chlorinated compounds in groundwater in the vicinity of AOC-1. The petroleum-related compounds were associated with a former underground storage tank (UST) that was identified and removed during Site characterization work in 2007 conducted by LBG, as described in Section 2.3.3. Operations at the former Cleaners have resulted in contamination of the soil around a sump located at the northern edge of the Site building within the basement of the former Cleaners, as well as the groundwater in the vicinity of the former Cleaners. Prior to the 1970's, there were cesspools and leaching fields (potentially a continuing source area) installed throughout the Site. The Site's sanitary system was not connected to the Municipal sanitary sewer line until the 1970's.

2.3 Previous Environmental Investigations

This section provides an overview of the results of previous environmental investigations at the Site. The following environmental reports were reviewed by Roux Associates:

- *Subsurface Investigation Letter Report - Dry Cleaning Operation - Morton Village Plaza* prepared by Galdun Frankel Environmental dated October 2006 on behalf of Morton Village Realty Co., Inc.
- *Environmental Site Assessment - Phase II Report* prepared by Leggette, Brashears & Graham, Inc. (LBG) dated September 2007 on behalf of Morton Village Realty Co., Inc.
- *UST Closure and Remedial Summary Report - Former Classic French Cleaners - Morton Village Shopping Center* prepared by LBG dated September 2008 on behalf of Morton Village Realty Co., Inc.
- *Phase I Environmental Assessment - Morton Village Plaza* prepared by LBG dated February 2009 on behalf of Morton Village Realty Co., Inc.
- *Site Characterization Report - Former Morton Village Cleaners* prepared by HRP Associates, Inc. dated August 2011 on behalf of the NYSDEC.

Results of these reports are discussed in the subsections below.

2.3.1 Galdun Frankel Environmental, Subsurface Investigation Report

In September 2006, Galdun Frankel Environmental (GFE) completed a subsurface investigation at the Site to determine if soil or groundwater contamination has resulted from the operation of the former Cleaners. The GFE investigation included:

- Installation four soil boring (B1, B2, B3 and B4);
- Field screening of soil from each soil boring using a photoionization detector (PID) and visual observations; and
- Collection of six soil samples (B1-20', B2-3', B2-13', B2-25', B3-7' and B4-7'), one sediment sample (SUMP SEDIMENT) and two groundwater samples (B1GW and B2GW).

Soil boring B1 was installed on the southern side of the former Cleaners, and B2, B3 and B4 were installed on the northern side of the former Cleaners. B1 and B2 were advanced to a target depth of 85 ft-bgs; however, soil screening was not conducted from 50 to 85 ft-bgs at these locations. B3 and B4 were advanced to a target depth of 25 ft-bgs. Groundwater was observed at 75 ft-bgs. Groundwater samples were collected from B-1 and B-2 at a sample interval of 75 to 85 ft-bgs.

GFE inspected a sump located in the basement floor, on the north side of the former Cleaners. The sump received blow-down water from a boiler that was used in the dry cleaning process. The blow-down water was pumped to an overhead sewer line, which extended in an east to west direction, into adjoining commercial spaces. The sewer main is located to the north of the shopping center. GFE identified a void between the bottom of the basement floor slab and the top edges of the sump. A sediment sample was collected from inside the void. All soil, sediment and groundwater samples were sent to AmeriSci Laboratories and analyzed for volatile organic compounds (VOCs).

Summary of Subsurface Investigation Results

Field Screening

Elevated PID readings were detected in the first 13 feet of soil at B2. A PID reading of 1000 parts per million (ppm) was detected in soil from the 1 to 7 ft-bgs interval. Based on field screening activities, little to no evidence of contamination was observed from B1, B3 and B4.

Soil

Tetrachloroethylene (PCE) was detected in sample B2-3' at a concentration of 234 ppm.

Sediment

PCE was detected in SUMP SEDIMENT at a concentration of 3.74 ppm. Trichloroethylene (TCE) was detected in sample SUMP SEDIMENT at a concentration of 0.0147 ppm.

Groundwater

PCE was detected in samples B1GW and B2GW at a concentration of 11.9 parts per billion (ppb) and 546 ppb, respectively.

TCE was detected in sample B2GW at a concentration of 9.97 ppb. Cis-1,2-Dichloroethylene was detected in sample B2GW at a concentration of 5.09 ppb.

2.3.2 Leggette, Brashears & Graham, Inc. Environmental Site Assessment Phase II

In May 2007, Leggette, Brashears & Graham, Inc. (LBG) completed a subsurface investigation at the Site to determine the vertical and horizontal extent of soil and groundwater contamination in the vicinity of the former Cleaners. LBG's investigation included:

- Sewer and septic investigation;
- Field screening of soil from six soil borings (GP-1, GP-2, GP-3, MW-1, MW-2 and MW-3);
- Installation of three groundwater monitoring wells (MW-1 through MW-3); and
- Collection of four soil samples (GP-1 (5-7), MW-2 (7-9), GP-3 (9-11) and MW-3 (11-13), three groundwater samples (MW-1 through MW-3) and one sediment sample (Sump Sediment). All samples were sent to AMRO Environmental Laboratories, Corp and analyzed for VOCs including methyl tertiary-butyl ether (MTBE).

Soil borings GP-1, GP-2, GP-3, MW-2 and MW-3 were installed on the northern side of the former Cleaners; MW-1 was installed on the southern side of the former Cleaners.

During drilling activities at soil boring GP-2, a 6-inch diameter pipe was encountered at 6 ft-bgs. The pipe was identified as an active sanitary sewer connected to the former Cleaners sanitary

facilities. Soil above and below the pipe was screened with a PID; no elevated PID readings were detected.

As per LBG, Building Department data did not reveal a septic tank in the area.

Summary of Subsurface Investigation Results

Field Screening

The highest PID reading was detected from the 5 to 7 ft-bgs interval at GP-1 at a concentration of 18 ppm. There were no elevated PID readings in soils screened from soil borings GP-2 and MW-1.

Soil

PCE was detected in samples GP-1 (5-7) and GP-3 (9-11) at a concentration of 410 ppb and 85 ppb, respectively.

Sediment

PCE was detected in sample Sump Sediment (0-1), collected from the bottom of the sump, at a concentration of 830 ppb.

Groundwater

PCE was detected in MW-1, MW-2 and MW-3 at a concentration of 120 ppb, 72 ppb and 93 ppb, respectively.

TCE was detected in MW-1, MW-2 and MW-3 at a concentration of 16 ppb, 6.9 ppb and 9.4 ppb, respectively.

Cis-1,2-Dichloroethylene was detected in MW-1, MW-2 and MW-3 at a concentration of 23 ppb, 4.8 ppb and 7.4 ppb, respectively.

2.3.3 LBG UST Closure and Remedial Summary Report

In April 2008, LBG conducted remedial excavation activities at the Site, which included:

- Screening of soil during excavation activities with a PID;

- Removal of a sump structure located in the basement of the Site and excavation of soils beneath the former sump location;
- Location, excavation and removal of a suspected vent pipe located on the exterior of the north side of the Site;
- Removal of one 1,000-gallon underground storage tank (UST) encountered during exterior vent pipe excavation activities;
- Excavation of contaminated soils encountered in the vicinity of the former unknown UST;
- Collection of endpoint confirmation soil samples from the excavations for laboratory analysis; and
- Treatment of soil within the interior and exterior excavation areas with a remedial chemical oxidation compound in order to remediate any residual contamination.

The sump located in the basement of the former Cleaners measured two feet wide by two feet long by one foot deep. A 5.5 foot by 3.5 foot area was saw cut around the sump, and the entire structure was removed. Following removal of the sump structure, the area was excavated to 8 feet below the basement floor slab and a sump bottom soil endpoint sample was collected (Sump Bottom). Sump Bottom was submitted to Environmental Testing Laboratories, Inc., for analysis of VOCs, including MTBE.

During excavation activities of a vent pipe that was believed to have been associated with the heating oil above ground storage tank (AST) located in the former Cleaner's basement, a previously unknown 1,000-gallon single-wall steel UST was encountered. Approximately 50 gallons of oily water and sludge were removed from the interior of the UST by Metro Environmental. Upon removal, the UST was observed to be in poor condition with extensive surface corrosion and holes. Soil beneath the UST was impacted with petroleum. The New York State Department of Environmental Conservation was notified and spill number 08-00596 was assigned to the Site.

A total of seven endpoint soil samples (CL-N-SW, Bottom Main EX, East SW, West SW, Bottom F/O, South F/O and North SW F/O) were collected under the excavated UST. An eighth sample (South SW Base) was collected from the base of the building footing (former Cleaners).

All samples were submitted to Environmental Testing Laboratories, Inc., for analysis of VOCs including MTBE and semivolatile organic compounds (SVOCs).

During excavation activities, a total of 250.31 tons of soil was removed from the Site for disposal.

Following all excavation activities, a total of 360 pounds of the chemical oxidant RegenOx™ was mixed with water, according to manufacturer specifications, and applied directly to the southern portion of the UST excavation area along the foundation footings of the building, and 60 pounds of RegenOx™ mixed with water was applied directly to the bottom of the sump excavation. Prior to backfilling, a 4-inch slotted PVC sump was installed approximately 12.5 ft-bgs within the southern portion of the excavation, which was intended to serve as an additional precautionary measure to allow access to the subsurface for additional chemical oxidation applications and/or high-vacuum soil vapor extraction events, if necessary.

Post-Excavation Sample Results

There were no VOC or SVOC concentrations exceeding Technical and Administrative Guidance Memorandum (TAGM) 4046 from any of the endpoint samples collected within the UST excavation.

There were no VOC concentrations exceeding TAGM 4046 from the endpoint soil sample collected from the sump excavation.

Groundwater samples were not collected during UST closure and remedial activities.

2.3.4 LBG Phase I Environmental Assessment

A Phase I ESA was conducted in 2009 by LBG on behalf of Morton Village, to inspect the Site and review historical and current land usage at and in the vicinity of the Site to evaluate if any RECs are present at or affecting the Site. The scope of work included a Site reconnaissance, review of Federal, State and local databases, research of historical documentation and review of available past environmental reports for the Site and Adjacent properties. In addition, the scope of work included the regulatory database investigation of all properties within ASTM standard search distances from the Site.

Phase I Findings

The Blue Angel Diner had corrosive cleaners stored in the basement as well as a refrigerant system for the two walk-in refrigerator/freezers. A floor drain was located directly beneath the refrigerant system equipment.

Numerous chemicals were observed in the basement of Hi Tech 1-Hour Photo in the area of a chemical mixing station, two photograph printing units and a chemical recovery system. Significant staining was observed on the floor surrounding the photograph development equipment as well as the chemical recovery system.

The main sanitary sewer line for Building B runs along the north side of the buildings and connects to the sewer main located on Rex Place. However, cesspools and leaching fields were installed on the Site prior to connection to the sewer and the locations of these former structures are unknown.

Stormwater is collected in catch-basins and is discharged through drywells/leaching pools.

2.3.5 HRP Associates, Inc. Site Characterization Report

During November 2010, a Site characterization was completed by HRP Associates, Inc. (HRP) on behalf of the NYSDEC to investigate on-Site media (soil, soil vapor and groundwater) potentially impacted by operations of the former Cleaners. The HRP Site characterization included:

- Installation of five soil borings (SB-01 through SB-05) to a target depth of 120 ft-bgs;
- Collection of 26 soil samples from intervals described below:
 - Samples were collected at SB-1, SB-3, SB-4 and SB-5 from intervals: 79-81 ft-bgs, 89-91 ft-bgs, 99-101 ft-bgs, 109-111 ft-bgs, and 119-121 ft-bgs;
 - Samples were collected at SB-2 from intervals: 79-81 ft-bgs, 89-101 ft-bgs, 99-101 ft-bgs, and 114-116 ft-bgs;
- Collection of 22 discrete groundwater samples from the five soil borings (SB-1 through SB-5). The groundwater samples collected from SB-1 through SB-5 were identified as GW-1 through GW-5 and were collected from intervals described below:
 - Samples were collected at GW-1, GW-4, and GW-5 from intervals: 91-91.5 ft-bgs, 101-101.5 ft-bgs, 111-111.5 ft-bgs, and 121-121.5 ft-bgs;

- Samples were collected at GW-2 from intervals: 81-81.5 ft-bgs, 91-91.5 ft-bgs, 101-101.5 ft-bgs, 111-111.5 ft-bgs, and 118-120 ft-bgs;
- Samples were collected at GW-3 from intervals: 81-81.5 ft-bgs, 91-91.5 ft-bgs, 101-101.5 ft-bgs, 111-111.5 ft-bgs, and 121-121.5 ft-bgs;
- Development and collection of three groundwater samples from existing monitoring wells (MW-1 through MW-3); and
- Installation and collection of six soil vapor samples (SV-1 through SV-6) and one outdoor ambient air sample (AA-1). All soil vapor points were installed at a depth of 8 ft-bgs. SV-1 through SV-4 were installed in the parking lot behind (northern side) of the former Cleaners, and SV-5 and SV-6 were installed in the side walk in front (southern side) of the former Cleaner.

All soil and groundwater samples were sent to Environmental Laboratories Testing, Inc and all soil vapor samples were sent to Centek Laboratories. All soil samples were analyzed for VOCs. A total of five soil samples (one per boring) were also analyzed for SVOCs, pesticides, polychlorinated biphenyls (PCBs), and 8 RCRA Metals.

All groundwater samples were analyzed for VOCs, SVOCs and 8 RCRA Metals (Total and Dissolved).

All soil vapor samples were analyzed for VOCs (TO-15).

Summary of Results

Soil

There were no VOC or SVOC detections above Part 375 Unrestricted Use soil cleanup objectives (Unrestricted SCOs) or Commercial Use SCOs in any of the soil samples.

Chromium was detected in all five soil samples (SB-1 (99-101), SB-2 (79-81), SB-3 (89-91), SB-4 (119-121) and SB-5 (99-101) above Part 375 Unrestricted Use Soil Cleanup Objectives (Unrestricted SCOs) at concentrations ranging from 1.38 mg/kg to 2.02 mg/kg. There were no metal detections above Commercial SCOs.

Groundwater

Multiple VOCs including, PCE, TCE, cis-1,2-Dichloroethylene, and methyl tert-butyl ether (MTBE) were detected above NYSDEC Class GA Criteria in multiple samples collected from discrete groundwater samples (GW-1 through GW-5) as well as the existing monitoring wells samples, with the highest concentrations detected in GW-3 and MW-3. GW-3 and MW-3 are both located immediately south of the former Cleaners.

PCE was detected at concentrations ranging from 0.95 micrograms per liter ($\mu\text{g/L}$) to 88 $\mu\text{g/L}$, as detected in samples GW-1 (121-121.5) and MW-3, respectively.

TCE was detected at concentrations of 46 $\mu\text{g/L}$, 25 $\mu\text{g/L}$ and 43 $\mu\text{g/L}$, as in GW-3 (81-81.5), GW-3 (91-91.5) and MW-3, respectively.

No metals, pesticides or PCBs were detected above NYSDEC Class GA Criteria in any groundwater samples.

Soil Vapor

Multiple VOCs including, chlorinated VOCs and petroleum related VOCs were detected in all of the soil vapor samples and ambient air sample.

PCE was detected in soil vapor samples at a concentration ranging from 110 ppbv to 3,900 ppbv. PCE was detected in the outdoor ambient air sample at a concentration of 15 ppbv.

TCE was detected in soil vapor samples at a concentration ranging from 0.87 ppbv to 580 ppbv. TCE was not detected in the outdoor ambient air sample.

2.4 Data Usability

Previous groundwater and soil analytical data developed by GFE, LBG and HRP were evaluated by Roux Associates and assumed reliable. All previous soil and groundwater analytical data are provided in Tables 1 and 2, respectively.

3.0 RI WORK PLAN OBJECTIVES, SCOPE, AND RATIONALE

This section provides a description of the RI objectives, scope of work and rationale.

3.1 Objectives and Rationale to Develop Remedial Investigation Work Plan

The previous environmental investigations have documented the following area of concern (AOC-1):

- Former Morton Village Cleaners, a/k/a Classic French Cleaners, (including the area [asphalt lot] immediately north of the former Cleaners):
 - Chlorinated VOCs (CVOCs) in soil and groundwater.

Based on the available environmental reports for the Site and known data gaps, including no source area being identified, the following objectives have been identified for the revised RIWP:

- Evaluate soil, groundwater and soil vapor quality associated with AOC-1;
- Evaluate the potential for impacts from the suspected historical septic system (potential source of CVOCs in soil/groundwater) that was associated with the former Cleaners; and
- Delineate the nature and extent of previously-documented CVOC impacts to soil and groundwater.

In order to address these objectives, this investigation will be completed in a phased approach (Phase A and Phase B).

Phase A of the RI will include the collection of soil samples and the installation of groundwater monitoring wells and collection of groundwater samples using a Geoprobe[®]. The purpose of this phase of the RI is to locate a suspected historical septic sanitary system and to collect sufficient sub-surface samples (soil and groundwater) to generate analytical data so that, together with the historical data generated by others, including groundwater and soil sampling, the appropriate sample locations for Phase B of the RI can be determined, as described below.

Phase B of the RI will include the installation and sampling of an upgradient groundwater monitoring well (RMW-3). The location of RMW-3 will be dependent on Phase A findings (i.e., groundwater flow direction). In addition, Phase B will include the completion of a soil vapor investigation at the Site. The soil vapor investigation will include the collection of soil vapor samples from locations specific to historical data and Phase A findings as well as the collection of

sub-slab and indoor air samples within the on-Site building (currently a Subway restaurant). The purpose of this phase of the RI is to collect sufficient sub-surface samples to generate analytical data so that, together with the historical data generated by others and data generated by Phase A of this RI, including groundwater and soil sampling, the Site will be sufficiently characterized to support the development of the FSWP.

All Phase B sample locations will be discussed with and approved by NYSDEC and New York State Department of Health (NYSDOH) prior to completion.

If a source area of the CVOC impacted groundwater (i.e., historical septic sanitary system) is not located, the environmental data collected during Phase A and B of the RI will be used in conjunction with the previous data to develop the scope of work for a supplemental RI. However, if a source area is identified, the environmental data will be used to develop the information necessary to support the development of a FSWP and identify the remediation track to be targeted.

3.2 Phase A RI Scope

The scope of Phase A of the RI is designed to locate a suspected historical septic sanitary system and to collect sufficient sub-surface samples to generate analytical data so that, together with the historical data generated by others, including groundwater and soil sampling, the appropriate sample locations for Phase B of the investigation can be determined in order to sufficiently characterize the Site to support the development of the FSWP. To accomplish this, Phase A of the RI will focus on the following:

- Attempt to locate a potential source area (historical septic sanitary system); and
- The collection of soil and groundwater data sufficient to define the nature and extent of impacted media.

The scope of each component of Phase A of the RI is discussed in the following subsections. The proposed scope of work will be as follows:

- Site's records on both the town (Oyster Bay) and county (Nassau) level will be reviewed to determine whether a historic sanitary system (i.e. septic tank, leaching pools) exists beneath the Site that may have received discharges from the former Cleaners and may be acting as a continuing source of VOCs to groundwater beneath the Site.

- Conduct a geophysical survey including but not limited to, ground penetrating radar (GPR) to identify a suspected historical septic system in the vicinity of the former Cleaners space;
- Install six soil borings in order to delineate extent of impacts to soil, and address existing data gaps;
- Install one soil boring on the northeast side of the former UST excavation area, as requested by the NYSDEC in their letter dated July 24, 2015, to confirm current soil conditions in this area;
- Install up to two monitoring wells and collect groundwater samples to further assess groundwater quality; and
- Collect one groundwater grab sample (water table sample) in the vicinity of previously installed soil boring B-1, as requested by the NYSDEC in their July 24, 2015 comment letter, to confirm the groundwater quality at this location.

Detailed field sampling procedures are provided in the FSP (Appendix A). The proposed sampling locations are shown on Figure 3. Tables 3 and 4 summarize the approximate location and rationale for the proposed sampling locations.

3.2.1 Historical Septic System Investigation

Prior to any invasive activity, Roux Associates will use a subcontractor to conduct a geophysical survey in an attempt to identify historical sanitary systems and underground utility lines (i.e., septic, sewer, water, electric, gas, etc.). The geophysical survey will utilize electromagnetic resonance and GPR technology. The survey will be performed in the back of the shopping plaza, behind the building that includes the former Cleaners (AOC-1).

3.2.2 Soil Characterization

Six soil borings (RSB-1 through RSB-6) will be installed at locations biased toward the location (determined or assumed) of the historical septic sanitary system. The proposed soil boring locations are shown on Figure 3. Actual locations may vary based on field conditions (i.e., agency file reviews, results of the geophysical survey, access constraints, subsurface obstructions, and/or utilities). An additional soil boring (RSB-7) will be installed on the northeast side of the former UST excavation area (see Figure 3). All soil boring locations will be cleared to a minimum of five ft-bgs using hand tools and/or vacuum excavator to identify any potential subsurface utilities. Following utility clearance activities, the soil borings will be advanced using a Geoprobe® or

hollow stem auger (HSA) drill rig. Soil samples will be collected continuously, and will be visually inspected and screened for organic vapors with a photoionization detector (PID), until below the assumed bottom depth of the historical sanitary system (approximately 30 ft-bgs), with the exception of RSB-7. At RSB-7, soil samples will be collected continuously to two feet below the assumed UST bottom excavation depth of 7 ft-bgs (LBG, 2008). Soil lithology will be recorded according to the Unified Soils Classification System (USCS). If evidence of contamination (organic vapors, staining or odors) is present at 30 ft-bgs at RSB-1 through RSB-6 and 9 ft-bgs at RSB-7, the drilling will continue at the boring location until the evidence is no longer detected. A soil sample will be collected from the interval exhibiting the greatest evidence of impacts such as elevated PID detections, odors or staining. A second soil sample will be collected from the terminal depth of the boring (to be determined during field activities). If no evidence of impacts is observed during borehole advancement, the soil sample will be obtained from 28-30 ft-bgs interval at RSB-1 through RSB-6 and from 7-9 ft-bgs interval at RSB-7 and submitted for laboratory analysis.

Attempts will be made to reach the desired termination depths using a Geoprobe™ drill rig. If the Geoprobe™ drill rig is consistently unable to reach the termination depths, the sampling program may be modified to include the HSA drill rig.

All soil samples will be analyzed for the full Target Compound List (TCL) VOCs via United States Environmental Protection Agency (USEPA) Method 8260. All soil samples will be analyzed by Alpha Analytical of Westborough, Massachusetts, which is a New York State Department of Health Environmental Laboratory Approval Program-certified laboratory. Samples will be analyzed on a standard turnaround time and will be reported as Category B data deliverables, which will be used to generate a data usability summary report (DUSR).

All proposed soil borings not converted to monitoring wells will be backfilled with soil cuttings, if no evidence of impacted soil, and finished at grade with an asphalt patch. If evidence of impacted soil is observed at a soil boring, the soil will be containerized in 55 gallon DOT-approved drums and the soil boring will be backfilled with clean sand. Excess soil cuttings as well as the aforementioned impacted soil generated during soil boring activities will be containerized in 55 gallon DOT-approved drums, labeled, and stored on-Site pending laboratory results and proper off-Site disposal.

3.2.3 Groundwater Investigation

If contamination is observed, the two groundwater monitoring wells (RMW-1 and RMW-2) are proposed to be installed in the two soil borings with the greatest degree of evidence of contamination. RMW-1 and RMW-2 will be installed at approximately the same depths (i.e., 70-90 ft-bgs) as existing monitoring wells MW-1 through MW-3 in order to verify previous results at that depth. Each monitoring well will be constructed of 2-inch diameter Schedule 40 polyvinyl chloride (PVC) with a 10-slot screen installed to span the water table. A gravel pack consisting of #2 Morie Sand or equivalent will be placed around the screen and up to two-feet above the top of the screened interval followed by a 1 to 2 foot layer of bentonite pellets. The bentonite pellets will be given time to hydrate before filling the remainder of the well annulus with bentonite grout using the tremie method. All monitoring wells will be completed with a flush-mounted manhole protective curb box installed at grade. The proposed monitoring well locations are shown on Figure 3. If evidence of contamination is not detected in any of the six soil borings, we propose to install one monitoring well in this area for additional Site characterization.

Each well will be developed to ensure proper hydraulic connection with the aquifer and to reduce/eliminate turbidity. The wells will be developed using a submersible pump, which will be surged periodically until well yield is consistent and has turbidity below 50 nephelometric turbidity units (NTUs), or the equivalent of 10 well casing volumes have been purged. Detailed procedures regarding well development are found in the FSP (Appendix A). Excess soil cutting and groundwater generated during well installation (including development and purging prior to sample collection) will be containerized in 55 gallon DOT-approved drums, labeled, and stored on-Site pending laboratory results and proper off-Site disposal.

To characterize groundwater flow and quality conditions following well installation and development, the new monitoring wells will be gauged and sampled. As part of the gauging round, water-level measurements will be recorded from the newly installed wells (RMW-1 and RMW-2) as well as existing monitoring wells (MW-1 through MW-3) to further define groundwater flow patterns beneath the Site.

Following the groundwater gauging event and waiting one week after well development, a groundwater sampling event will be completed. To ensure groundwater samples collected are representative of the conditions in the surrounding aquifer, monitoring wells will be purged prior to sample collection using low flow procedures as outlined in USEPA document titled “Low Stress (Low Flow) Purging and Sampling Procedures for the Collection of Groundwater Samples From Monitoring Wells” (USEPA, 2010). Additional information regarding groundwater sampling procedures is in the FSP (Appendix A).

Groundwater samples will be collected and analyzed for:

- TCL VOCs via USEPA Method 8260

Field parameters (dissolved oxygen, pH, conductivity, turbidity, temperature and oxidation-reduction potential) will also be collected during well sampling activities.

In addition, a groundwater grab sample will be collected at the water table from a boring (RB-1) installed adjacent to previously completed soil boring B-1 (installed by HRP), as requested by the NYSDEC in their comment letter dated July 24, 2015. RB-1 will be installed using a Geoprobe® or HSA drill rig to establish current groundwater conditions at this location.

During groundwater grab sampling activities, a two foot long retractable stainless steel screen will be advanced by the Geoprobe® to two feet below the water table (approximately 70 ft-bgs). Upon reaching sampling depth (approximately 72 ft-bgs), the drill string will be retracted by two feet to expose the screen. A groundwater grab sample will be collected using the same sampling procedures as describe above.

If the Geoprobe® is unable to advance to sampling depth (approximately 72 ft-bgs), RB-1 will be completed with a HSA rig. Upon reaching sampling depth with the HSA, a temporary 2-inch diameter PVC well will be installed within the drill string (i.e., augers) and a groundwater grab sample will be collected using the sample sampling procedures describe above.

Groundwater grab sample will be collected and analyzed for:

- TCL VOCs via USEPA Method 8260

Field parameters (dissolved oxygen, pH, conductivity, turbidity, temperature and oxidation-reduction potential) will also be collected during groundwater grab sampling activities.

All groundwater samples will be analyzed by Alpha Analytical of Westborough, Massachusetts, which is a New York State Department of Health Environmental Laboratory Approval Program-certified laboratory. Samples will be analyzed on a standard turnaround time and will be reported as Category B data deliverables.

More information on sample analyses is provided in the QAPP (Appendix B).

3.3 Phase B RI Scope

The scope of Phase B of the RI is designed to collect sufficient sub-surface samples to generate analytical data so that, together with the historical data generated by others and data generated by Phase A of this RI, including groundwater and soil sampling, the Site will be sufficiently characterized to support the development of the FSWP. To accomplish this, Phase B of the RI will focus on the following:

- The collection of an additional groundwater sample (i.e., upgradient monitoring well), and soil vapor, sub-slab and indoor air data sufficient to define the nature and extent of impacted media.

The scope of each component of Phase B of the RI is discussed in the following subsections. The proposed scope of work will be as follows:

- Installation and sampling of an upgradient monitoring well (location will be based on Phase A groundwater flow findings) in order to delineate extent of impacts to groundwater and address existing data gaps; and
- The installation and sampling of soil vapor monitoring points based on historical data and Phase A findings, including the collection and sampling of sub-slab and indoor air samples within the on-Site building (currently Subway restaurant).

All Phase B sample locations will be discussed with and approved by the NYSDEC/NYSDOH prior to completion.

3.3.1 Groundwater Investigation

Based on Phase A groundwater flow findings, one upgradient monitoring well (RMW-3) will be installed to access upgradient groundwater conditions at the Site. RMW-3 will be installed and sampled using the same field procedures and laboratory methods used in Phase A of this RI. In addition, RMW-3 will be gauged and sampled following the procedures described in Section 3.2.3.

Following installation activities, an additional gauging event will be conducted and will include the collection of water-level measurements from all newly installed wells (RMW-1, RMW-2 and RMW-3) as well as existing monitoring wells (MW-1 through MW-3) to further define groundwater flow patterns beneath the Site.

3.3.2 Soil Vapor Investigation

Based on historical data and Phase A findings, a soil vapor investigation will be conducted to assess both on-Site and off-Site soil vapor conditions. The data collected will be used to complete a qualitative exposure assessment. Soil vapor sampling will be conducted throughout the Site, based on historical data and Phase A findings. In addition, sub-slab and indoor air samples will be collected within the on-Site building to assess the current conditions within the building. Soil vapor samples will be collected with a Summa canister over a two-hour period using a regulator; the sub-slab and indoor air samples will be collected with a Summa canister over an eight-hour period using a regulator. All soil vapor, sub-slab and indoor air samples will be analyzed for VOCs via USEPA Method TO-15.

3.4 Qualitative Exposure Assessment

A qualitative exposure assessment (EA) will be performed following the collection of all Phase A and Phase B and potential supplemental RI data. The EA will be performed in accordance with Section 3.3(c)4 of DER-10 and the NYSDOH guidance for performing a qualitative EA (NYSDEC DER-10; Technical Guidance for Site Investigation and Remediation; (Appendix 3 B). The results of the qualitative EA will be provided in the RI report.

3.5 Fish and Wildlife Resource Impact Analysis

A Fish and Wildlife Resource Impact Analysis is not necessary due to the Site's location.

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) PROTOCOLS

The goal of QA/QC is to ensure that suitable and verifiable data results from sampling and analysis performed. To accomplish this, a Quality Assurance Project Plan (QAPP) has been prepared and is provided as Appendix B.

5.0 HEALTH AND SAFETY

A site-specific Health and Safety Plan (HASP) and Community Air Monitoring Plan (CAMP) have been prepared for the Site and are provided in Appendix C. Decontamination plans and details can be found in Section 12.0 of the HASP (Appendix C).

The Property Owner and associated parties preparing the remedial documents submitted to the State, and parties performing this work are responsible for the safe performance of all invasive work, and for the integrity and safety of structures that may be affected by the intrusive activities (such as buildings, foundations and bridge footings). HAZWOPER training to on-Site workers and personnel will be provided as required for remedial investigation activities as appropriate. Copies of the 40 Hour OSHA course certificates for all on-Site personnel will be submitted to the NYSDEC and NYSDOH.

6.0 REPORTING AND SCHEDULE

The following will be provided to the NYSDEC during the course of the RI work.

Progress Reports

Progress report submittals to be provided to NYSDEC will include the following:

- Daily Reports will be provided to the NYSDEC Project Manager during all periods of major investigative activity on remedial projects. These reports will include a summary of daily activities. These reports will also include a summary of substantive findings and other pertinent information including any complaints received from the public.
- Identification or lack of identification of the historical septic system during RI activities will be promptly communicated to the NYSDEC Project Manager.
- Monthly progress reports will be submitted to the NYSDEC Project Manager until the Certificate of Completion is issued.
- A Site map will be provided to identify locations discussed in progress reports provided to the NYSDEC.

Feasibility Study Work Plan (FSWP)

Following the completion of these phases of the RI and if a supplement RI is not warranted, a FSWP will be prepared and will include alternative remedies that will be evaluated to eliminate the Site's threat to public health or the environment. The FSWP will be submitted to the NYSDEC concurrently with the RI Report (described below) within two months of receipt of all final RI analytical data.

RI Report

Following the completion of RI activities a RI Report will be prepared within 2 months of receipt of all final RI analytical data and will include a description of the procedures followed and the results, including data summary tables and maps showing the extent of impacts to soil, groundwater and soil vapor. The RI Report will include all data developed during all RI activities, and will meet the technical requirements of NYSDEC DER-10; Technical Guidance for Site Investigation and Remediation. All RI analyses will be performed in accordance with the NYSDEC ASP, using USEPA SW-846 methods. The laboratory selected to analyze the field samples collected during the RI shall maintain a NYSDOH Environmental Laboratory Approval Program (ELAP) certification for each of the analyses listed in Section 3.0.

All laboratory data are to be reported in NYSDEC ASP Category B deliverables and will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC's website (<http://www.dec.ny.gov/chemical/62440.html>). A Data Usability Report will be prepared meeting the requirements in Section 2.2(a)1.ii and Appendix 2B of DER-10 for all data packages generated for the RI.

Hazardous wastes and other contaminated media generated during RI phase will be stored, transported, and disposed in full compliance with applicable local, state, and federal regulations.

A table of the construction details for monitoring wells that have been built on-Site will be submitted. This will include date of construction, geologic interval screened, and current status (e.g., available for sampling, destroyed, intact, needs development, etc.).

The RI Report will include a conceptual site model that explains the occurrence of contaminant sources and their fate and transport at the Site in the context of the local Site stratigraphy and hydrogeology. The conceptual model will utilize both plan and cross-sectional views of the Site.

Copies of the transport manifests of hazardous and nonhazardous investigative waste will be provided to the NYSDEC Project Manager.

Following completion of the FSWP, a FS Report (FSR) will be prepared. The FSR will provide the basis for selection of a remedy that effectively eliminates the threat posed by contaminants at the Site, which will be used to prepare a Remedial Work Plan (RWP) for the Site.

Following completion of the FSR, a RWP will be prepared. The RWP will provide a detailed description of the remedial action and the remedial technology to be conducted for each area of concern.

SCHEDULE	
Reports/Work Plans	Date
Revised Remedial Investigation Work Plan Submittal	September 2015
Remedial Investigation Field Work	October 2015
Feasibility Study Work Plan Submittal	December 2015

SCHEDULE	
Reports/Work Plans	Date
Remedial Investigation Report Submittal	December 2015
Feasibility Study Report Submittal	February 2016
Remedial Work Plan Submittal	April 2016
Remedial Action	June 2016
Remedial Action Report Submittal	August 2016
Certificate of Completion Issuance	October 2016

**Remedial Investigation Work Plan
1022 Old Country Road, Plainview, New York 11803**

TABLES

1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP
2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
3. Proposed Soil Sampling Location Rationale
4. Proposed Groundwater Sample Location Rationale

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation: Sample Date: Sample Depth (ft bg):	Sump	Bottom	Bottom	Bottom	Bottom	South SW	
	Part 375	Part 375	Part 375		Bottom ³	CL-N-SW ³	Main Ex. ³	East SW ³	West SW ³	F/O ³	F/O ³
	Unrestricted	Commercial	Protection of		4/14/2008	4/16/2008	4/16/2008	4/16/2008	4/16/2008	4/16/2008	4/16/2008
	Use	Use	Groundwater		19.5	10	12	10	10	11	10
1,1,1-Trichloroethane	680	500000	680		0.57 U	0.54 U	0.53 U	0.54 U	0.53 U	0.55 U	0.54 U
1,1,2,2-Tetrachloroethane	--	--	--		0.66 U	0.62 U	0.61 U	0.62 U	0.61 U	0.63 U	0.62 U
1,1,2-Trichloroethane	--	--	--		0.69 U	0.66 U	0.64 U	0.66 U	0.64 U	0.66 U	0.66 U
1,1-Dichloroethane	270	240000	270		0.63 U	0.59 U	0.58 U	0.59 U	0.58 U	0.60 U	0.49 U
1,1-Dichloroethene	330	500000	330		0.41 U	0.38 U	0.38 U	0.38 U	0.38 U	0.39 U	0.38 U
1,2,3-Trichlorobenzene	--	--	--		0.53 U	0.50 U	0.49 U	0.50 U	0.49 U	0.50 U	0.50 U
1,2,4-Trichlorobenzene	--	--	--		0.37 U	0.35 U	0.35 U	0.35 U	0.35 U	0.36 U	0.35 U
1,2-Dibromoethane	--	--	--		0.65 U	0.61 U	0.60 U	0.61 U	0.60 U	0.62 U	0.61 U
1,2-Dichlorobenzene	1100	500000	1100		0.52 U	0.49 U	0.48 U	0.49 U	0.48 U	0.49 U	0.49 U
1,2-Dichloroethane	20	30000	20		0.64 U	0.60 U	0.59 U	0.60 U	0.59 U	0.61 U	0.60 U
1,2-Dichloropropane	--	--	--		0.65 U	0.61 U	0.60 U	0.61 U	0.60 U	0.60 U	0.61 U
1,3-Dichlorobenzene	2400	280000	2400		0.58 U	0.55 U	0.54 U	0.55 U	0.54 U	0.56 U	0.55 U
1,4-Dichlorobenzene	1800	130000	1800		0.53 U	0.50 U	0.49 U	0.50 U	0.48 U	0.50 U	0.50 U
2-Butanone (MEK)	120	500000	120		2.44 U	2.31 U	2.26 U	2.31 U	2.26 U	2.33 U	2.31 U
2-Hexanone	--	--	--		2.18 U	2.06 U	2.02 U	2.06 U	2.02 U	2.08 U	2.06 U
4-Methyl-2-pentanone (MIBK)	--	--	--		2.37 U	2.24 U	2.19 U	2.24 U	2.19 U	2.26U	2.24 U
Acetone	50	500000	50		2.86 U	2.7 U	2.65 U	2.70 U	2.65 U	2.73U	2.70 U
Benzene	60	4400	60		0.58 U	0.55 U	0.54 U	0.55 U	0.54 U	0.56 U	0.55 U
Bromochloromethane	--	--	--		0.64 U	0.60 U	0.59 U	0.60 U	0.59 U	0.61 U	0.60 U
Bromodichloromethane	--	--	--		0.52 U	0.49 U	0.48 U	0.49 U	0.48 U	0.49 U	0.49 U
Bromoform	--	--	--		0.53 U	0.50 U	0.49 U	0.50 U	0.49 U	0.50 U	0.50 U
Bromomethane	--	--	--		0.54 U	0.51 U	0.50 U	0.51 U	0.50 U	0.51 U	0.51 U
Carbon disulfide	--	--	--		0.52 U	0.49 U	0.48 U	0.49 U	0.48 U	0.49 U	0.49 U
Carbon tetrachloride	760	2200	760		0.62 U	0.58 U	0.57 U	0.58 U	0.57 U	0.59 U	0.58 U
Chlorobenzene	1100	500000	1100		0.67 U	0.63 U	0.62 U	0.63 U	0.62 U	0.64 U	0.63 U
Chloroethane	--	--	--		0.77 U	0.73 U	0.71 U	0.73 U	0.71 U	0.74 U	0.73 U
Chloroform	370	350000	370		0.65 U	0.61 U	0.60 U	0.61 U	0.60 U	0.62 U	0.61 U
Chloromethane	--	--	--		0.55 U	0.52 U	0.51 U	0.52 U	0.51 U	0.52 U	0.52 U
cis-1,2-Dichloroethene	250	500000	250		0.50 U	0.47 U	0.46 U	0.47 U	0.46 U	0.47 U	0.47 U
cis-1,3-Dichloropropene	--	--	--		0.56 U	0.53 U	0.52 U	0.53 U	0.52 U	0.54 U	0.53 U
Cyclohexane	--	--	--		NA	NA	NA	NA	NA	NA	NA
Dibromochloromethane	--	--	--		0.51 U	0.48 U	0.47 U	0.48 U	0.47 U	0.48 U	0.48 U

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation: Sample Date: Sample Depth (ft bg):	Sump	Bottom	Bottom	Bottom	Bottom	South SW
	Part 375 Unrestricted Use	Part 375 Commercial Use	Part 375 Protection of Groundwater		Bottom ³	CL-N-SW ³	Main Ex. ³	East SW ³	West SW ³	F/O ³
Dibromochloropropane	--	--	--		NA	NA	NA	NA	NA	NA
Dichlorodifluoromethane					0.41 U	0.38 U	0.38 U	0.38 U	0.38 U	0.39 U
Ethylbenzene	1000	390000	1000		0.57 U	0.54 U	0.53 U	0.54 U	0.53 U	0.55 U
Freon 113	--	--	--		NA	NA	NA	NA	NA	NA
Isopropylbenzene	--	--	--		0.48 U	0.46 U	0.45 U	0.46 U	0.45 U	0.46 U
m+p-Xylene	--	--	--		0.99 U	0.94 U	0.92 U	0.94 U	0.92 U	0.94 U
Methyl acetate	--	--	--		NA	NA	NA	NA	NA	NA
Methylcyclohexane	--	--	--		NA	NA	NA	NA	NA	NA
Methylene chloride	50	500000	50		1.03 U	0.98 U	0.96 U	0.98 U	0.96 U	0.99 U
MTBE	930	500000	930		0.57 U	0.54 U	0.53 U	0.54 U	0.53 U	0.55 U
o-Xylene	--	--	--		0.43 U	0.41 U	0.40 U	0.41 U	0.40 U	0.41 U
Styrene	--	--	--		0.47 U	0.45 U	0.44 U	0.45 U	0.44 U	0.45 U
Tetrachloroethene	1300	150000	1300		0.50 U	0.47 U	20.9	0.47 U	0.46 U	1.54 J
Toluene	700	500000	700		0.53 U	0.70 J	0.69 J	0.69 J	0.71 J	0.65 J
trans-1,2-Dichloroethene	190	500000	190		0.51 U	0.48 U	0.47 U	0.48 U	0.47 U	0.48 U
trans-1,3-Dichloropropene	--	--	--		0.46 U	0.44 U	0.43 U	0.44 U	0.43 U	0.44 U
Trichloroethene	470	200000	470		0.54 U	0.51 U	0.50 U	0.51 U	0.50 U	0.51 U
Trichlorofluoromethane	--	--	--		0.62 U	0.58 U	0.57 U	0.58 U	0.57 U	0.59 U
Vinyl chloride	20	1300	20		0.75 U	0.71 U	0.69 U	0.71 U	0.69 U	0.71 U
Xylenes (total)	260	500000	1600		0.43 U	0.41 U	0.40 U	0.41 U	0.40 U	0.41 U

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from LBG 2008 UST Closure Report

⁴ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated value

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

µg/kg - Micrograms per kilogram

ft bg - Feet below grade

*Reporting Limit was not provided in the associated report

NA - Not available in associated report

NYSDEC - New York State Department of Environmental Conservation

-- No NYSDEC Part 375 Standards available

Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards

Shaded data indicates that parameter was detected above the NYSDEC Part 375 Commercial Use Standards

Boxed data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater Standards

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation:	North SW	South SW	SB-5 ⁴	SB-5 ⁴	SB-5 ⁴	SB-5 RE ⁴		
	Part 375	Part 375	Part 375		F/O ³	(Base) ³						
	Unrestricted	Commercial	Protection of		Sample Date:	Sample Date:					Sample Date:	Sample Date:
	Use	Use	Groundwater		4/16/2008	4/21/2008					11/12/2010	11/12/2010
			Sample Depth (ft bg):	10	12.5	79-81	89-91	99-101	99-101			
1,1,1-Trichloroethane	680	500000	680		0.60 U	0.54 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,1,2,2-Tetrachloroethane	--	--	--		0.70 U	0.62 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,1,2-Trichloroethane	--	--	--		0.73 U	0.66 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,1-Dichloroethane	270	240000	270		0.66 U	0.59 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,1-Dichloroethene	330	500000	330		0.43 U	0.38 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,2,3-Trichlorobenzene	--	--	--		0.56 U	0.50 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,2,4-Trichlorobenzene	--	--	--		0.39 U	0.35 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,2-Dibromoethane	--	--	--		0.68 U	0.61 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,2-Dichlorobenzene	1100	500000	1100		0.55 U	0.49 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,2-Dichloroethane	20	30000	20		0.67 U	0.60 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,2-Dichloropropane	--	--	--		0.68 U	0.61 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,3-Dichlorobenzene	2400	280000	2400		0.61 U	0.55 U	5.9 U	6.2 U	6.2 U	6.2 U		
1,4-Dichlorobenzene	1800	130000	1800		0.56 U	0.50 U	5.9 U	6.2 U	6.2 U	6.2 U		
2-Butanone (MEK)	120	500000	120		2.58 U	2.31 U	29 U	31 U	31 U	31 U		
2-Hexanone	--	--	--		2.30 U	2.06 U	29 U	31 U	31 U	31 U		
4-Methyl-2-pentanone (MIBK)	--	--	--		2.49 U	2.24 U	29 U	31 U	31 U	31 U		
Acetone	50	500000	50		3.02 U	2.70 U	29 U	31 U	31 U	31 U		
Benzene	60	4400	60		0.61 U	0.55 U	5.9 U	6.2 U	6.2 U	6.2 U		
Bromochloromethane	--	--	--		0.67 U	0.60 U	5.9 U	6.2 U	6.2 U	6.2 U		
Bromodichloromethane	--	--	--		0.55 U	0.49 U	5.9 U	6.2 U	6.2 U	6.2 U		
Bromoform	--	--	--		0.56 U	0.50 U	5.9 U	6.2 U	6.2 U	6.2 U		
Bromomethane	--	--	--		0.57 U	0.51 U	5.9 U	6.2 U	6.2 U	6.2 U		
Carbon disulfide	--	--	--		0.55 U	0.49 U	5.9 U	6.2 U	6.2 U	6.2 U		
Carbon tetrachloride	760	2200	760		0.65 U	0.58 U	5.9 U	6.2 U	6.2 U	6.2 U		
Chlorobenzene	1100	500000	1100		0.71 U	0.63 U	5.9 U	6.2 U	6.2 U	6.2 U		
Chloroethane	--	--	--		0.81 U	0.73 U	5.9 U	6.2 U	6.2 U	6.2 U		
Chloroform	370	350000	370		0.68 U	0.61 U	5.9 U	6.2 U	6.2 U	6.2 U		
Chloromethane	--	--	--		0.58 U	0.52 U	5.9 U	6.2 U	6.2 U	6.2 U		
cis-1,2-Dichloroethene	250	500000	250		0.52 U	0.47 U	5.9 U	6.2 U	6.2 U	6.2 U		
cis-1,3-Dichloropropene	--	--	--		0.59 U	0.53 U	5.9 U	6.2 U	6.2 U	6.2 U		
Cyclohexane	--	--	--		NA	NA	5.9 U	6.2 U	6.2 U	6.2 U		
Dibromochloromethane	--	--	--		0.53 U	0.48 U	5.9 U	6.2 U	6.2 U	6.2 U		

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation: Sample Date: Sample Depth (ft bg):	North SW	South SW	SB-5 ⁴	SB-5 ⁴	SB-5 ⁴	SB-5 RE ⁴				
	Part 375	Part 375	Part 375		F/O ³	(Base) ³								
	Unrestricted	Commercial	Protection of		4/16/2008	4/21/2008					11/12/2010	11/12/2010	11/12/2010	11/12/2010
	Use	Use	Groundwater		10	12.5					79-81	89-91	99-101	99-101
Dibromochloropropane	--	--	--		NA	NA	5.9 U	6.2 U	6.2 U	6.2 U				
Dichlorodifluoromethane	--	--	--		0.43 U	0.38 U	5.9 U	6.2 U	6.2 U	6.2 U				
Ethylbenzene	1000	390000	1000		0.60 U	0.54 U	5.9 U	6.2 U	6.2 U	6.2 U				
Freon 113	--	--	--		NA	NA	NA	NA	NA	NA				
Isopropylbenzene	--	--	--		0.51 U	0.46 U	5.9 U	6.2 U	6.2 U	6.2 U				
m+p-Xylene	--	--	--		1.04 U	0.94 U	12 U	12 U	12 U	12 U				
Methyl acetate	--	--	--		NA	NA	5.9 U	6.2 U	6.2 U	6.2 U				
Methylcyclohexane	--	--	--		NA	NA	5.9 U	6.2 U	6.2 U	6.2 U				
Methylene chloride	50	500000	50		1.09 U	0.98 U	1.8 J	6.2 U	2.4 J	6.2 U				
MTBE	930	500000	930		0.60 U	0.54 U	5.9 U	6.2 U	6.2 U	6.2 U				
o-Xylene	--	--	--		0.45 U	0.41 U	5.9 U	6.2 U	6.2 U	6.2 U				
Styrene	--	--	--		0.50 U	0.45 U	5.9 U	6.2 U	6.2 U	6.2 U				
Tetrachloroethene	1300	150000	1300		166	1.04 J	5.9 U	6.2 U	6.2 U	6.2 U				
Toluene	700	500000	700		0.85 J	0.50 U	5.9 U	6.2 U	6.2 U	6.2 U				
trans-1,2-Dichloroethene	190	500000	190		0.53 U	0.48 U	5.9 U	6.2 U	6.2 U	6.2 U				
trans-1,3-Dichloropropene	--	--	--		0.49 U	0.55 U	5.9 U	6.2 U	6.2 U	6.2 U				
Trichloroethene	470	200000	470		2.78 J	0.51 U	5.9 U	6.2 U	6.2 U	6.2 U				
Trichlorofluoromethane	--	--	--		0.65 U	0.58 U	5.9 U	6.2 U	6.2 U	6.2 U				
Vinyl chloride	20	1300	20		0.79 U	0.71 U	5.9 U	6.2 U	6.2 U	6.2 U				
Xylenes (total)	260	500000	1600		0.45 U	0.41 U	5.9 U	6.2 U	6.2 U	6.2 U				

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from LBG 2008 UST Closure Report

⁴ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated value

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

µg/kg - Micrograms per kilogram

ft bg - Feet below grade

*Reporting Limit was not provided in the associated report

NA - Not available in associated report

NYSDEC - New York State Department of Environmental Conservation

-- No NYSDEC Part 375 Standards available

Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards

Shaded data indicates that parameter was detected above the NYSDEC Part 375 Commercial Use Standards

Boxed data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater Standards

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation:	SB-5 ⁴	SB-5 ⁴	SB-1 ⁴	SB-1 ⁴	SB-1 ⁴	SB-1 ⁴
	Part 375	Part 375	Part 375	Sample Date:	11/12/2010	11/12/2010	11/8/2010	11/8/2010	11/8/2010	11/8/2010
	Unrestricted	Commercial	Protection of	Sample Depth (ft bg):	109-111	119-121	79-81	89-91	99-101	109-111
	Use	Use	Groundwater							
1,1,1-Trichloroethane	680	500000	680		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,1,2,2-Tetrachloroethane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,1,2-Trichloroethane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,1-Dichloroethane	270	240000	270		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,1-Dichloroethene	330	500000	330		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,2,3-Trichlorobenzene	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,2,4-Trichlorobenzene	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,2-Dibromoethane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,2-Dichlorobenzene	1100	500000	1100		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,2-Dichloroethane	20	30000	20		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,2-Dichloropropane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,3-Dichlorobenzene	2400	280000	2400		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
1,4-Dichlorobenzene	1800	130000	1800		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
2-Butanone (MEK)	120	500000	120		31 U	30 U	29 U	31 U	30 U	31 U
2-Hexanone	--	--	--		31 U	30 U	29 U	31 U	30 U	31 U
4-Methyl-2-pentanone (MIBK)	--	--	--		31 U	30 U	29 U	31 U	30 U	31 U
Acetone	50	500000	50		31 U	30 U	29 U	31 U	30 U	31 U
Benzene	60	4400	60		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Bromochloromethane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Bromodichloromethane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Bromoform	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Bromomethane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Carbon disulfide	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Carbon tetrachloride	760	2200	760		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Chlorobenzene	1100	500000	1100		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Chloroethane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Chloroform	370	350000	370		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Chloromethane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
cis-1,2-Dichloroethene	250	500000	250		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
cis-1,3-Dichloropropene	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Cyclohexane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Dibromochloromethane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation:	SB-5 ⁴	SB-5 ⁴	SB-1 ⁴	SB-1 ⁴	SB-1 ⁴	SB-1 ⁴
	Part 375	Part 375	Part 375	Sample Date:	11/12/2010	11/12/2010	11/8/2010	11/8/2010	11/8/2010	11/8/2010
	Unrestricted	Commercial	Protection of	Sample Depth (ft bg):	109-111	119-121	79-81	89-91	99-101	109-111
	Use	Use	Groundwater							
Dibromochloropropane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Dichlorodifluoromethane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Ethylbenzene	1000	390000	1000		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Freon 113	--	--	--		NA	NA	NA	NA	NA	NA
Isopropylbenzene	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
m+p-Xylene	--	--	--		12 U	12 U	12 U	12 U	12 U	12 U
Methyl acetate	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Methylcyclohexane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Methylene chloride	50	500000	50		6.1 U	2.2 J	3.2 J	4.1 J	6.0 U	4.0 J
MTBE	930	500000	930		4.5 J	5.6 J	5.9 U	6.1 U	6.0 U	6.1 U
o-Xylene	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Styrene	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Tetrachloroethene	1300	150000	1300		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Toluene	700	500000	700		1.4 J	1.1 J	1.2 J	1.8 J	1.7 J	6.1 U
trans-1,2-Dichloroethene	190	500000	190		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
trans-1,3-Dichloropropene	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Trichloroethene	470	200000	470		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Trichlorofluoromethane	--	--	--		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Vinyl chloride	20	1300	20		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U
Xylenes (total)	260	500000	1600		6.1 U	6.0 U	5.9 U	6.1 U	6.0 U	6.1 U

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from LBG 2008 UST Closure Report

⁴ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated value

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

µg/kg - Micrograms per kilogram

ft bg - Feet below grade

*Reporting Limit was not provided in the associated report

NA - Not available in associated report

NYSDEC - New York State Department of Environmental Conservation

-- No NYSDEC Part 375 Standards available

Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards

Shaded data indicates that parameter was detected above the NYSDEC Part 375 Commercial Use Standards

Boxed data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater Standards

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation:						
	Part 375	Part 375	Part 375	SB-1 ⁴	SB-2 ⁴	SB-2 ⁴	SB-2 ⁴	SB-2 ⁴	SB-3 ⁴	
	Unrestricted	Commercial	Protection of	Sample Date:	11/8/2010	11/9/2010	11/9/2010	11/9/2010	11/9/2010	11/10/2010
	Use	Use	Groundwater	Sample Depth (ft bg):	119-121	79-81	89-91	99-101	114-116	79-81
1,1,1-Trichloroethane	680	500000	680	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,1,2,2-Tetrachloroethane	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,1,2-Trichloroethane	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,1-Dichloroethane	270	240000	270	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,1-Dichloroethene	330	500000	330	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,2,3-Trichlorobenzene	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,2,4-Trichlorobenzene	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,2-Dibromoethane	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,2-Dichlorobenzene	1100	500000	1100	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,2-Dichloroethane	20	30000	20	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,2-Dichloropropane	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,3-Dichlorobenzene	2400	280000	2400	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
1,4-Dichlorobenzene	1800	130000	1800	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
2-Butanone (MEK)	120	500000	120	31 U	31 U	31 U	30 U	30 U	30 U	
2-Hexanone	--	--	--	31 U	31 U	31 U	30 U	30 U	30 U	
4-Methyl-2-pentanone (MIBK)	--	--	--	31 U	31 U	31 U	30 U	30 U	30 U	
Acetone	50	500000	50	31 U	31 U	31 U	30 U	30 U	30 U	
Benzene	60	4400	60	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Bromochloromethane	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Bromodichloromethane	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Bromoform	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Bromomethane	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Carbon disulfide	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Carbon tetrachloride	760	2200	760	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Chlorobenzene	1100	500000	1100	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Chloroethane	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Chloroform	370	350000	370	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Chloromethane	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
cis-1,2-Dichloroethene	250	500000	250	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
cis-1,3-Dichloropropene	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Cyclohexane	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	
Dibromochloromethane	--	--	--	6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U	

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation:	SB-1 ⁴	SB-2 ⁴	SB-2 ⁴	SB-2 ⁴	SB-2 ⁴	SB-3 ⁴
	Part 375 Unrestricted Use	Part 375 Commercial Use	Part 375 Protection of Groundwater	Sample Date:	11/8/2010	11/9/2010	11/9/2010	11/9/2010	11/9/2010	11/10/2010
				Sample Depth (ft bg):	119-121	79-81	89-91	99-101	114-116	79-81
Dibromochloropropane	--	--	--		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
Dichlorodifluoromethane	--	--	--		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
Ethylbenzene	1000	390000	1000		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
Freon 113	--	--	--		NA	NA	NA	NA	NA	NA
Isopropylbenzene	--	--	--		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
m+p-Xylene	--	--	--		12 U	12 U	12 U	12 U	12 U	12 U
Methyl acetate	--	--	--		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
Methylcyclohexane	--	--	--		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
Methylene chloride	50	500000	50		3.1 J	6.1 U	2.2 J	2.4 J	1.9 J	6
MTBE	930	500000	930		6.1 U	6.1 U	6.2 U	6.0 U	2.7 J	5.9 U
o-Xylene	--	--	--		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
Styrene	--	--	--		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
Tetrachloroethene	1300	150000	1300		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	1.6 J
Toluene	700	500000	700		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
trans-1,2-Dichloroethene	190	500000	190		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
trans-1,3-Dichloropropene	--	--	--		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
Trichloroethene	470	200000	470		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
Trichlorofluoromethane	--	--	--		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
Vinyl chloride	20	1300	20		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U
Xylenes (total)	260	500000	1600		6.1 U	6.1 U	6.2 U	6.0 U	6.0 U	5.9 U

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from LBG 2008 UST Closure Report

⁴ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated value

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

µg/kg - Micrograms per kilogram

ft bg - Feet below grade

*Reporting Limit was not provided in the associated report

NA - Not available in associated report

NYSDEC - New York State Department of Environmental Conservation

-- No NYSDEC Part 375 Standards available

Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards

Shaded data indicates that parameter was detected above the NYSDEC Part 375 Commercial Use Standards

Boxed data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater Standards

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation:	SB-3 ⁴	SB-3 ⁴	SB-3 ⁴	SB-3 ⁴	SB-4 ⁴	Duplicate ⁴
	Part 375 Unrestricted Use	Part 375 Commercial Use	Part 375 Protection of Groundwater	Sample Date:	11/10/2010	11/10/2010	11/10/2010	11/10/2010	11/11/2010	11/11/2010
				Sample Depth (ft bg):	89-91	99-101	109-111	119-121	79-81	
1,1,1-Trichloroethane	680	500000	680		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,1,2,2-Tetrachloroethane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,1,2-Trichloroethane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,1-Dichloroethane	270	240000	270		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,1-Dichloroethene	330	500000	330		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,2,3-Trichlorobenzene	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,2,4-Trichlorobenzene	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,2-Dibromoethane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,2-Dichlorobenzene	1100	500000	1100		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,2-Dichloroethane	20	30000	20		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,2-Dichloropropane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,3-Dichlorobenzene	2400	280000	2400		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
1,4-Dichlorobenzene	1800	130000	1800		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
2-Butanone (MEK)	120	500000	120		31 U	30 U	30 U	30 U	30 U	30 U
2-Hexanone	--	--	--		31 U	30 U	30 U	30 U	30 U	30 U
4-Methyl-2-pentanone (MIBK)	--	--	--		31 U	30 U	30 U	30 U	30 U	30 U
Acetone	50	500000	50		31 U	30 U	30 U	30 U	30 U	30 U
Benzene	60	4400	60		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Bromochloromethane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Bromodichloromethane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Bromoform	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Bromomethane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Carbon disulfide	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Carbon tetrachloride	760	2200	760		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Chlorobenzene	1100	500000	1100		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Chloroethane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Chloroform	370	350000	370		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Chloromethane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
cis-1,2-Dichloroethene	250	500000	250		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
cis-1,3-Dichloropropene	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Cyclohexane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Dibromochloromethane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation:	SB-3 ⁴	SB-3 ⁴	SB-3 ⁴	SB-3 ⁴	SB-4 ⁴	Duplicate ⁴
	Part 375	Part 375	Part 375							
	Unrestricted	Commercial	Protection of	Sample Date:	11/10/2010	11/10/2010	11/10/2010	11/10/2010	11/11/2010	11/11/2010
	Use	Use	Groundwater	Sample Depth (ft bg):	89-91	99-101	109-111	119-121	79-81	
Dibromochloropropane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Dichlorodifluoromethane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Ethylbenzene	1000	390000	1000		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Freon 113	--	--	--		NA	NA	NA	NA	NA	NA
Isopropylbenzene	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
m+p-Xylene	--	--	--		12 U	12 U	12 U	12 U	12 U	12 U
Methyl acetate	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Methylcyclohexane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Methylene chloride	50	500000	50		2 J	2.8 J	2.2 J	2.5 J	2.3 J	2.0 J
MTBE	930	500000	930		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
o-Xylene	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Styrene	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Tetrachloroethene	1300	150000	1300		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Toluene	700	500000	700		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
trans-1,2-Dichloroethene	190	500000	190		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
trans-1,3-Dichloropropene	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Trichloroethene	470	200000	470		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Trichlorofluoromethane	--	--	--		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Vinyl chloride	20	1300	20		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U
Xylenes (total)	260	500000	1600		6.2 U	6.0 U	5.9 U	6.1 U	5.9 U	6.1 U

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from LBG 2008 UST Closure Report

⁴ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated value

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

µg/kg - Micrograms per kilogram

ft bg - Feet below grade

*Reporting Limit was not provided in the associated report

NA - Not available in associated report

NYSDEC - New York State Department of Environmental Conservation

-- No NYSDEC Part 375 Standards available

Bold data indicates that parameter was detected above the NYSDEC Part 375 Unrestricted Use Standards

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Boxed data indicates that parameter was detected above the NYSDEC Part 375 Protection of Groundwater Standards

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation:	SB-4 ⁴	SB-4 ⁴	SB-4 ⁴	SB-4 ⁴
	Part 375 Unrestricted Use	Part 375 Commercial Use	Part 375 Protection of Groundwater	Sample Date:	11/11/2010	11/11/2010	11/11/2010	11/11/2010
				Sample Depth (ft bg):	89-91	99-101	109-111	119-121
1,1,1-Trichloroethane	680	500000	680		6.3 U	6.4 U	6.2 U	6.1 U
1,1,2,2-Tetrachloroethane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
1,1,2-Trichloroethane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
1,1-Dichloroethane	270	240000	270		6.3 U	6.4 U	6.2 U	6.1 U
1,1-Dichloroethene	330	500000	330		6.3 U	6.4 U	6.2 U	6.1 U
1,2,3-Trichlorobenzene	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
1,2,4-Trichlorobenzene	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
1,2-Dibromoethane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
1,2-Dichlorobenzene	1100	500000	1100		6.3 U	6.4 U	6.2 U	6.1 U
1,2-Dichloroethane	20	30000	20		6.3 U	6.4 U	6.2 U	6.1 U
1,2-Dichloropropane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
1,3-Dichlorobenzene	2400	280000	2400		6.3 U	6.4 U	6.2 U	6.1 U
1,4-Dichlorobenzene	1800	130000	1800		6.3 U	6.4 U	6.2 U	6.1 U
2-Butanone (MEK)	120	500000	120		31 U	32 U	31 U	31 U
2-Hexanone	--	--	--		31 U	32 U	31 U	31 U
4-Methyl-2-pentanone (MIBK)	--	--	--		31 U	32 U	31 U	31 U
Acetone	50	500000	50		31 U	32 U	31 U	31 U
Benzene	60	4400	60		6.3 U	6.4 U	6.2 U	6.1 U
Bromochloromethane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Bromodichloromethane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Bromoform	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Bromomethane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Carbon disulfide	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Carbon tetrachloride	760	2200	760		6.3 U	6.4 U	6.2 U	6.1 U
Chlorobenzene	1100	500000	1100		6.3 U	6.4 U	6.2 U	6.1 U
Chloroethane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Chloroform	370	350000	370		6.3 U	6.4 U	6.2 U	6.1 U
Chloromethane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
cis-1,2-Dichloroethene	250	500000	250		6.3 U	6.4 U	6.2 U	6.1 U
cis-1,3-Dichloropropene	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Cyclohexane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Dibromochloromethane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U

Table 1. Summary of Volatile Organic Compounds in Soil Samples Collected by GFE, LBG and HRP, 1022 Old Country Road, Plainview, New York

Parameter (Concentrations in µg/kg)	NYSDEC	NYSDEC	NYSDEC	Sample Designation:	SB-4 ⁴	SB-4 ⁴	SB-4 ⁴	SB-4 ⁴
	Part 375 Unrestricted Use	Part 375 Commercial Use	Part 375 Protection of Groundwater	Sample Date:	11/11/2010	11/11/2010	11/11/2010	11/11/2010
				Sample Depth (ft bg):	89-91	99-101	109-111	119-121
Dibromochloropropane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Dichlorodifluoromethane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Ethylbenzene	1000	390000	1000		6.3 U	6.4 U	6.2 U	6.1 U
Freon 113	--	--	--		NA	NA	NA	NA
Isopropylbenzene	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
m+p-Xylene	--	--	--		12 U	12 U	12 U	12 U
Methyl acetate	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Methylcyclohexane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Methylene chloride	50	500000	50		2.6 J	3.2 J	3.1 J	3.1 J
MTBE	930	500000	930		6.3 U	6.4 U	6.2 U	6.1 U
o-Xylene	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Styrene	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Tetrachloroethene	1300	150000	1300		6.3 U	6.4 U	6.2 U	6.1 U
Toluene	700	500000	700		6.3 U	6.4 U	6.2 U	6.1 U
trans-1,2-Dichloroethene	190	500000	190		6.3 U	6.4 U	6.2 U	6.1 U
trans-1,3-Dichloropropene	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Trichloroethene	470	200000	470		6.3 U	6.4 U	6.2 U	6.1 U
Trichlorofluoromethane	--	--	--		6.3 U	6.4 U	6.2 U	6.1 U
Vinyl chloride	20	1300	20		6.3 U	6.4 U	6.2 U	6.1 U
Xylenes (total)	260	500000	1600		6.3 U	6.4 U	6.2 U	6.1 U

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from LBG 2008 UST Closure Report

⁴ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated value

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

µg/kg - Micrograms per kilogram

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*Reporting Limit was not provided in the associated report

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**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: B1GW ¹ B2GW ¹ MW-1 ² MW-2 ² MW-3 ² MW-1 ³ MW-2 ³ MW-3 ³								
		Sample Date: 9/26/2006 9/26/2006 6/1/2007 6/1/2007 6/1/2007 11/16/2010 11/16/2010 11/16/2010								
1,1,1-Trichloroethane	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
1,1,2,2-Tetrachloroethane	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
1,1,2-Trichloroethane	1	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
1,1-Dichloroethane	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
1,1-Dichloroethene	5	NA	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
1,2,3-Trichlorobenzene	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
1,2,4-Trichlorobenzene	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
1,2-Dibromoethane	--	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
1,2-Dichlorobenzene	3	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
1,2-Dichloroethane	0.6	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
1,2-Dichloropropane	1	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
1,3-Dichlorobenzene	3	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
1,4-Dichlorobenzene	3	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
2-Butanone (MEK)	50	NA	NA	10 U	10 U	11 U	5.0 U	5.0 U	5.0 U	
2-Hexanone	50	NA	NA	2.0 U	2.0 U	2.0 U	5.0 U	5.0 U	5.0 U	
4-Methyl-2-pentanone (MIBK)	--	NA	NA	10 U	10 U	10 U	5.0 U	5.0 U	5.0 U	
Acetone	50	NA	NA	10 U	10 U	10 U	5.0 U	5.0 U	5.0 U	
Benzene	1	NA	NA	1.0U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Bromochloromethane	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Bromodichloromethane	50	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Bromoform	50	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Bromomethane	5	NA	NA	NA	NA	NA	1.0 U	1.0 U	1.0 U	
Carbon disulfide	60	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Carbon tetrachloride	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Chlorobenzene	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Chloroethane	5	NA	NA	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	
Chloroform	7	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Chloromethane	--	NA	NA	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	
cis-1,2-Dichloroethene	5	5.09	ND*	23	4.8	7.4	1.3	0.95 J	43	
cis-1,3-Dichloropropene	5	NA	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Cyclohexane	--	NA	NA	NA	NA	NA	1.0 U	1.0 U	1.0 U	
Dibromochloromethane	50	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Dibromochloropropane	--	NA	NA	5.0 U	5.0 U	5.0 U	NA	NA	NA	

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: B1GW ¹ B2GW ¹ MW-1 ² MW-2 ² MW-3 ² MW-1 ³ MW-2 ³ MW-3 ³								
		Sample Date: 9/26/2006 9/26/2006 6/1/2007 6/1/2007 6/1/2007 11/16/2010 11/16/2010 11/16/2010								
Dichlorodifluoromethane	5	NA	NA	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	
Ethylbenzene	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Freon 113	--	NA	NA	NA	NA	NA	NA	NA	NA	
Isopropylbenzene	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
m+p-Xylene	5	NA	NA	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U	
Methyl acetate	--	NA	NA	NA	NA	NA	1.0 U	1.0 U	1.0 U	
Methylcyclohexane	--	NA	NA	NA	NA	NA	1.0 U	1.0 U	1.0 U	
Methylene chloride	5	NA	NA	5.0 U	5.0 U	5.0 U	1.0 U	1.0 U	1.0 U	
MTBE	10	NA	NA	2.0 U	2.2	2.0U	0.92 J	1.4	1.0 U	
o-Xylene	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Styrene	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Tetrachloroethene	5	11.9	546	120	72	93	25	24	88	
Toluene	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
trans-1,2-Dichloroethene	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.7	
trans-1,3-Dichloropropene	--	NA	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	
Trichloroethene	5	ND*	9.97	16	6.9	9.4	2.3	2.4	26	
Trichlorofluoromethane	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Vinyl chloride	2	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	
Xylenes (total)	5	NA	NA	2.0 U	2.0 U	2.0 U	1.0 U	1.0 U	1.0 U	

NYSDEC - New York State Department of Environmental Conservation

AWQSGVs - Ambient Water-Quality Standards and Guidance Values

µg/L -Micrograms per liter

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated Value

U - Compound was analyzed for but not detected

*Reporting Limit was not provided in the associated report

-- No NYSDEC AWQSGV available

Bold data indicates that parameter was detected above the NYSDEC AWQSGVs

NA - Not available in the associated report

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: GW-5 (91-91.5) ³ GW-5 (101-101.5) ³ GW-5 (111-111.5) ³ GW-5 (121-121.5) ² GW-1 (91-91.5) ³				
		Sample Date: 11/12/2010	11/12/2010	11/12/2010	11/12/2010	11/8/2010
1,1,1-Trichloroethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	0.6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (MEK)	50	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	50	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (MIBK)	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	50	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	50	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	50	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	60	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	5	1.0 U	1.0 U	1.3	0.9 J	1.0 U
Chloroform	7	1.0 U	1.0 U	1.0 U	1.0 U	0.53 J
Chloromethane	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	50	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloropropane	--	NA	NA	NA	NA	NA

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: GW-5 (91-91.5) ³ GW-5 (101-101.5) ³ GW-5 (111-111.5) ³ GW-5 (121-121.5) ² GW-1 (91-91.5) ³				
		Sample Date: 11/12/2010	11/12/2010	11/12/2010	11/12/2010	11/12/2010	11/8/2010
Dichlorodifluoromethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	--	NA	NA	NA	NA	NA
Isopropylbenzene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
m+p-Xylene	5	2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Methyl acetate	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylcyclohexane	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MTBE	10	1.0 U	1.0 U	1.0 U	1.0 U	6.2
o-Xylene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5	2.7	3.3	0.96 J	1.0 U	2.1
Toluene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	2	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

NYSDEC - New York State Department of Environmental Conservation

AWQSGVs - Ambient Water-Quality Standards and Guidance Values

µg/L -Micrograms per liter

¹- Data was obtained from GFE 2006 Site Characterization Report

²- Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³- Data was obtained from HRP 2011 Site Characterization Report

J - Estimated Value

U - Compound was analyzed for but not detected

*Reporting Limit was not provided in the associated report

-- No NYSDEC AWQSGV available

Bold data indicates that parameter was detected above the NYSDEC AWQSGVs

NA - Not available in the associated report

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: GW-1 (101-101.5) ³ GW-1 (111-111.5) ³ GW-1 (121-121.5) ³ GW-2 (81-81.5) ³ GW-2 (91-91.5) ³				
		Sample Date: 11/8/2010	11/8/2010	11/8/2010	11/8/2010	11/9/2010
1,1,1-Trichloroethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	0.6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (MEK)	50	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	50	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (MIBK)	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	50	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	50	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	50	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	60	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	7	1.0U	1.1	1.2	1.0 U	1.0 U
Chloromethane	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	50	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloropropane	--	NA	NA	NA	NA	NA

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: GW-1 (101-101.5) ³ GW-1 (111-111.5) ³ GW-1 (121-121.5) ³ GW-2 (81-81.5) ³ GW-2 (91-91.5) ³					
		Sample Date:	11/8/2010	11/8/2010	11/8/2010	11/9/2010	11/9/2010
Dichlorodifluoromethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	--		NA	NA	NA	NA	NA
Isopropylbenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
m+p-Xylene	5		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Methyl acetate	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylcyclohexane	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MTBE	10		6.6	2.9	1.0J	1.0U	3.2
o-Xylene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		2.1	3.1	0.95J	2.3	6.6
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	0.94 J
Trichlorofluoromethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	2		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

NYSDEC - New York State Department of Environmental Conservation

AWQSGVs - Ambient Water-Quality Standards and Guidance Values

µg/L -Micrograms per liter

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated Value

U - Compound was analyzed for but not detected

*Reporting Limit was not provided in the associated report

-- No NYSDEC AWQSGV available

Bold data indicates that parameter was detected above the NYSDEC AWQSGVs

NA - Not available in the associated report

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: GW-2 (101-101.5) GW-2 (111-111.5) GW-2RE (111-111.5) GW-2 (118-120) ³ GW-2RE (118-120) ²				
		Sample Date: 11/9/2010	11/9/2010	11/9/2010	11/9/2010	11/9/2010
1,1,1-Trichloroethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	0.6	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	3	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (MEK)	50	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	50	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (MIBK)	--	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	50	5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	1	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	50	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	50	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	60	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	7	0.52J	1.0U	1.0U	1.0U	1.0 U
Chloromethane	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,2-Dichloroethene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
cis-1,3-Dichloropropene	5	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	--	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	50	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloropropane	--	NA	NA	NA	NA	NA

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: GW-2 (101-101.5) ¹ GW-2 (111-111.5) ² GW-2RE (111-111.5) ² GW-2 (118-120) ³ GW-2RE (118-120) ²					
		Sample Date:	11/9/2010	11/9/2010	11/9/2010	11/9/2010	11/9/2010
Dichlorodifluoromethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	--		NA	NA	NA	NA	NA
Isopropylbenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
m+p-Xylene	5		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Methyl acetate	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylcyclohexane	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MTBE	10		1.0U	1.1	1.2	1.0 U	1.0 U
o-Xylene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		4.3	0.52J	0.57J	2.7	2.8
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,3-Dichloropropene	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		0.51 J	1.0 U	1.0 U	1.0 U	1.0 U
Trichlorofluoromethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	2		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

NYSDEC - New York State Department of Environmental Conservation

AWQSGVs - Ambient Water-Quality Standards and Guidance Values

µg/L -Micrograms per liter

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated Value

U - Compound was analyzed for but not detected

*Reporting Limit was not provided in the associated report

-- No NYSDEC AWQSGV available

Bold data indicates that parameter was detected above the NYSDEC AWQSGVs

NA - Not available in the associated report

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: GW-3 (81-81.5) ³ GW-3RE (81-81.5) ³ GW-3 (91-91.5) ³ GW-3 (101-101.5) ² GW-3 (111-111.5) ³					
		Sample Date:	11/10/2010	11/10/2010	11/10/2010	11/10/2010	11/10/2010
1,1,1-Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	3		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	0.6		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	3		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	3		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (MEK)	50		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	50		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (MIBK)	--		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	50		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	1		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	50		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	50		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	60		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	7		1.0U	1.0U	1.0U	1.0 U	1.0U
Chloromethane	--		1.0U	1.0U	1.0U	1.0 U	1.0U
cis-1,2-Dichloroethene	5		46	44	25	0.96 J	0.89J
cis-1,3-Dichloropropene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	50		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloropropane	--		NA	NA	NA	NA	NA

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: GW-3 (81-81.5) ³ GW-3RE (81-81.5) ³ GW-3 (91-91.5) ³ GW-3 (101-101.5) ² GW-3 (111-111.5) ³					
		Sample Date:	11/10/2010	11/10/2010	11/10/2010	11/10/2010	11/10/2010
Dichlorodifluoromethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	--		NA	NA	NA	NA	NA
Isopropylbenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
m+p-Xylene	5		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Methyl acetate	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylcyclohexane	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MTBE	10		1.0U	1.0U	2	1	1.0 U
o-Xylene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		56	56	58	8.1	6.2
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	5		3	3.1	1.4	1.0U	1.0U
trans-1,3-Dichloropropene	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		16	16	17	1.3	0.94 J
Trichlorofluoromethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	2		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

NYSDEC - New York State Department of Environmental Conservation

AWQSGVs - Ambient Water-Quality Standards and Guidance Values

µg/L -Micrograms per liter

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated Value

U - Compound was analyzed for but not detected

*Reporting Limit was not provided in the associated report

-- No NYSDEC AWQSGV available

Bold data indicates that parameter was detected above the NYSDEC AWQSGVs

NA - Not available in the associated report

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: GW-3 (121-121.5) ²		Duplicate ³	GW-4 (91-91.5) ³	GW-4 (101-101.5) ³	GW-4 (111-111.5) ³
		Sample Date:	11/10/2010	11/10/2010	11/10/2010	11/10/2010	11/10/2010
1,1,1-Trichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2,2-Tetrachloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1,2-Trichloroethane	1		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,1-Dichloroethene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,3-Trichlorobenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2,4-Trichlorobenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dibromoethane	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichlorobenzene	3		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloroethane	0.6		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,2-Dichloropropane	1		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,3-Dichlorobenzene	3		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
1,4-Dichlorobenzene	3		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
2-Butanone (MEK)	50		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
2-Hexanone	50		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
4-Methyl-2-pentanone (MIBK)	--		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Acetone	50		5.0 U	5.0 U	5.0 U	5.0 U	5.0 U
Benzene	1		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromochloromethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromodichloromethane	50		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromoform	50		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Bromomethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon disulfide	60		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Carbon tetrachloride	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chlorobenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Chloroform	7		1.0U	1.0U	1.0U	1.0U	1.0U
Chloromethane	--		1.0U	1.0U	1.0U	1.0U	1.0U
cis-1,2-Dichloroethene	5		1.0U	28	1.0U	1.0U	1.0U
cis-1,3-Dichloropropene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Cyclohexane	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloromethane	50		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Dibromochloropropane	--		NA	NA	NA	NA	NA

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: GW-3 (121-121.5) ²		Duplicate ³	GW-4 (91-91.5) ³	GW-4 (101-101.5) ³	GW-4 (111-111.5) ³
		Sample Date:	11/10/2010	11/10/2010	11/10/2010	11/10/2010	11/10/2010
Dichlorodifluoromethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Ethylbenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Freon 113	--		NA	NA	NA	NA	NA
Isopropylbenzene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
m+p-Xylene	5		2.0 U	2.0 U	2.0 U	2.0 U	2.0 U
Methyl acetate	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylcyclohexane	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Methylene chloride	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
MTBE	10		1.0U	1.0U	30	22	11
o-Xylene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Styrene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Tetrachloroethene	5		0.56 J	84	5.7	4.6	3.6
Toluene	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
trans-1,2-Dichloroethene	5		1.0 U	0.57 J	1.0U	1.0U	1.0U
trans-1,3-Dichloropropene	--		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Trichloroethene	5		1.0 U	19	0.9J	0.62J	1.0U
Trichlorofluoromethane	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Vinyl chloride	2		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U
Xylenes (total)	5		1.0 U	1.0 U	1.0 U	1.0 U	1.0 U

NYSDEC - New York State Department of Environmental Conservation

AWQSGVs - Ambient Water-Quality Standards and Guidance Values

µg/L -Micrograms per liter

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated Value

U - Compound was analyzed for but not detected

*Reporting Limit was not provided in the associated report

-- No NYSDEC AWQSGV available

Bold data indicates that parameter was detected above the NYSDEC AWQSGVs

NA - Not available in the associated report

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: Sample Date:	GW-4 (121-121.5) ³ 11/10/2010
1,1,1-Trichloroethane	5		1.0 U
1,1,2,2-Tetrachloroethane	5		1.0 U
1,1,2-Trichloroethane	1		1.0 U
1,1-Dichloroethane	5		1.0 U
1,1-Dichloroethene	5		1.0 U
1,2,3-Trichlorobenzene	5		1.0 U
1,2,4-Trichlorobenzene	5		1.0 U
1,2-Dibromoethane	--		1.0 U
1,2-Dichlorobenzene	3		1.0 U
1,2-Dichloroethane	0.6		1.0 U
1,2-Dichloropropane	1		1.0 U
1,3-Dichlorobenzene	3		1.0 U
1,4-Dichlorobenzene	3		1.0 U
2-Butanone (MEK)	50		5.0 U
2-Hexanone	50		5.0 U
4-Methyl-2-pentanone (MIBK)	--		5.0 U
Acetone	50		5.0 U
Benzene	1		1.0 U
Bromochloromethane	5		1.0 U
Bromodichloromethane	50		1.0 U
Bromoform	50		1.0 U
Bromomethane	5		1.0 U
Carbon disulfide	60		1.0 U
Carbon tetrachloride	5		1.0 U
Chlorobenzene	5		1.0 U
Chloroethane	5		1.0 U
Chloroform	7		0.95J
Chloromethane	--		1.0U
cis-1,2-Dichloroethene	5		1.0U
cis-1,3-Dichloropropene	5		1.0 U
Cyclohexane	--		1.0 U
Dibromochloromethane	50		1.0 U
Dibromochloropropane	--		NA

**Table 2. Summary of Volatile Organic Compounds in Groundwater Samples Collected by GFE, LBG and HRP
1022 Old Country Road, Plainview, New York**

Parameter (Concentrations in µg/L)	NYSDEC AWQSGVs (µg/L)	Sample Designation: Sample Date:	GW-4 (121-121.5) ³ 11/10/2010
Dichlorodifluoromethane	5		1.0 U
Ethylbenzene	5		1.0 U
Freon 113	--		NA
Isopropylbenzene	5		0.57 J
m+p-Xylene	5		2.0 U
Methyl acetate	--		1.0 U
Methylcyclohexane	--		1.0 U
Methylene chloride	5		1.0 U
MTBE	10		3.5
o-Xylene	5		1.0 U
Styrene	5		1.0 U
Tetrachloroethene	5		2.7
Toluene	5		1.0 U
trans-1,2-Dichloroethene	5		1.0U
trans-1,3-Dichloropropene	--		1.0 U
Trichloroethene	5		1.0U
Trichlorofluoromethane	5		1.0 U
Vinyl chloride	2		1.0 U
Xylenes (total)	5		1.0 U

NYSDEC - New York State Department of Environmental Conservation

AWQSGVs - Ambient Water-Quality Standards and Guidance Values

µg/L -Micrograms per liter

¹ - Data was obtained from GFE 2006 Site Characterization Report

² - Data was obtained from LBG 2007 Environmental Site Assessment Phase II Report

³ - Data was obtained from HRP 2011 Site Characterization Report

J - Estimated Value

U - Compound was analyzed for but not detected

*Reporting Limit was not provided in the associated report

-- No NYSDEC AWQSGV available

Bold data indicates that parameter was detected above the NYSDEC AWQSGVs

NA - Not available in the associated report

Table 3. Proposed Soil Sampling Locations, 1022 Old Country Road, Plainview, New York

Area of Concern (AOC)	Location	Matrix	Sample Depths*	Sample Parameters	Sampling Method**	Rationale
AOC-1	RSB-1	Soil	Up to 2 samples: interval with the highest elevated PID reading, and the terminal depth of the boring (to be determined during field activities)	TCL VOCs	SW-846 8260B	To delineate the nature and extent of contamination identified during previous investigations and identify the historic septic sanitary system
	RSB-2	Soil		TCL VOCs	SW-846 8260B	
	RSB-3	Soil		TCL VOCs	SW-846 8260B	
	RSB-4	Soil		TCL VOCs	SW-846 8260B	
	RSB-5	Soil		TCL VOCs	SW-846 8260B	
	RSB-6	Soil		TCL VOCs	SW-846 8260B	
	RSB-7	Soil		TCL VOCs	SW-846 8260B	At the request of NYSDEC, to confirm that all impacted soil was removed during previous remedial actions (i.e., UST removal).

* Depths are in feet from grade; Additional intervals may be added based on field observations
 ** Laboratory will report to their minimum possible standards for each method (QAPP Table 2)
 TCL - USEPA Contract Laboratory Program Target Compound List
 VOCs - Volatile Organic Compounds
 QA/QC samples will be collected as described in the QAPP (Appendix B)

Table 4. Proposed Groundwater Sampling Locations, 1022 Old Country Road, Plainview, New York

Area of Concern (AOC)	Monitoring Wells*	Matrix	Sample Depth**	Sample Parameters	Sampling Method***	Rationale
AOC-1						
Groundwater	RMW-1 and RMW-2	Groundwater	± 70-90	TCL VOCs	SW-846 8260B	To evaluate the nature and extent of groundwater impacts as indicated by previous investigations
	RWM-3	Groundwater	± 70-90	TCL VOCs	SW-846 8260B	At the request of NYSDEC, to evaluate upgradient groundwater
	RB-1	Groundwater	± 70-72	TCL VOCs	SW-846 8260B	At the request of NYSDEC, to evaluate the nature and extent of groundwater impacts as indicated by previous investigations

*- Locations based on soil boring field screening results

** - Feet below grade, screened interval of well or grab sample

*** - Laboratory will report to their minimum possible standards for each method (QAPP Table 2)

TCL - USEPA Contract Laboratory Program Target Compound List

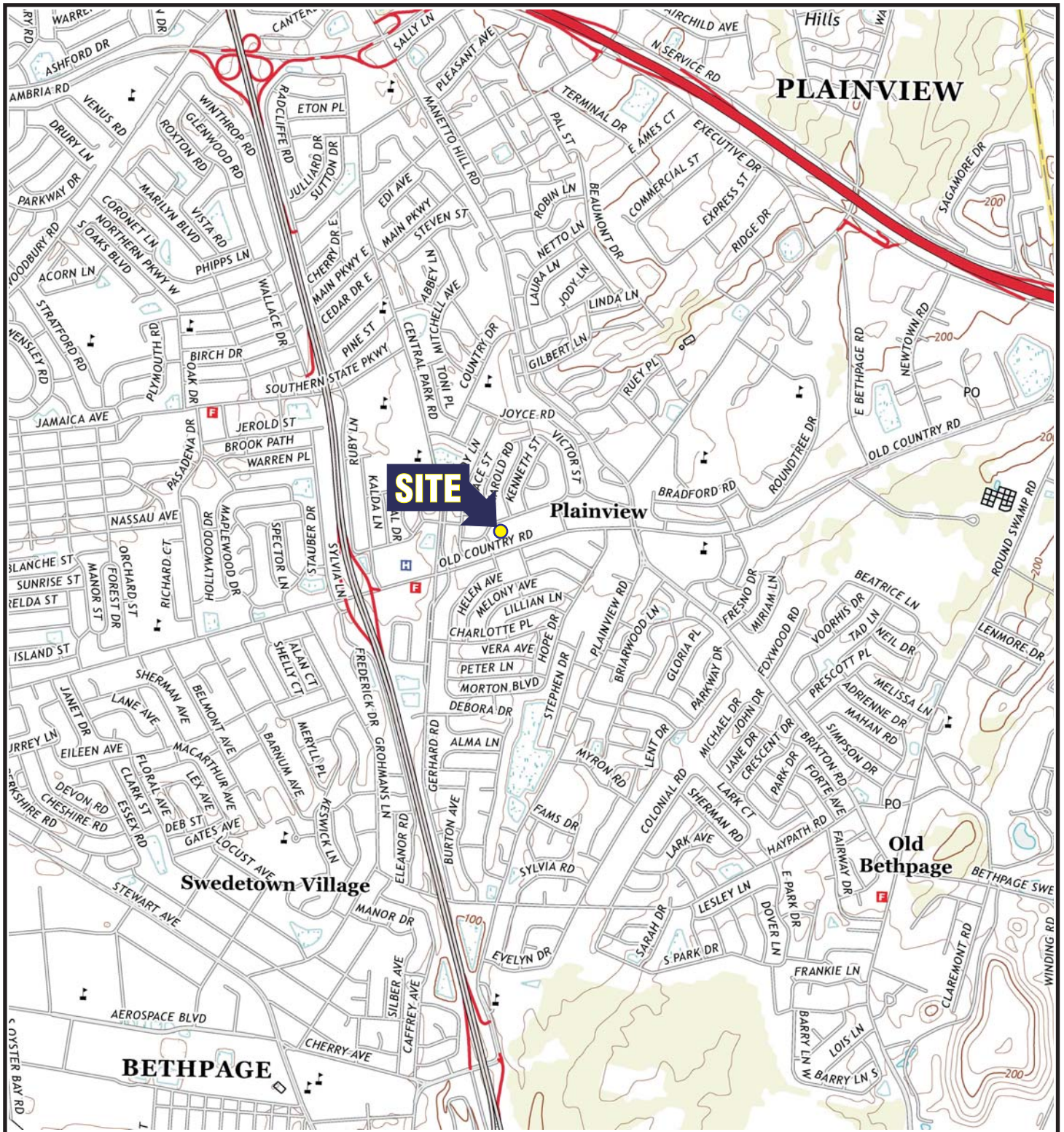
VOCs - Volatile Organic Compounds

QA/QC samples will be collected as described in the QAPP (Appendix C)

**Remedial Investigation Work Plan
1022 Old Country Road, Plainview, New York 11803**

FIGURES

1. Site Location Map
2. Previous Sampling Locations
3. Proposed Sample Locations



QUADRANGLE LOCATION



SOURCE:
USGS; 2013, HUNTINGTON, NY
7.5 Minute Topographic Quadrangle

Title:

SITE LOCATION MAP

1022 OLD COUNTRY ROAD
PLAINVIEW, NEW YORK

Prepared for:

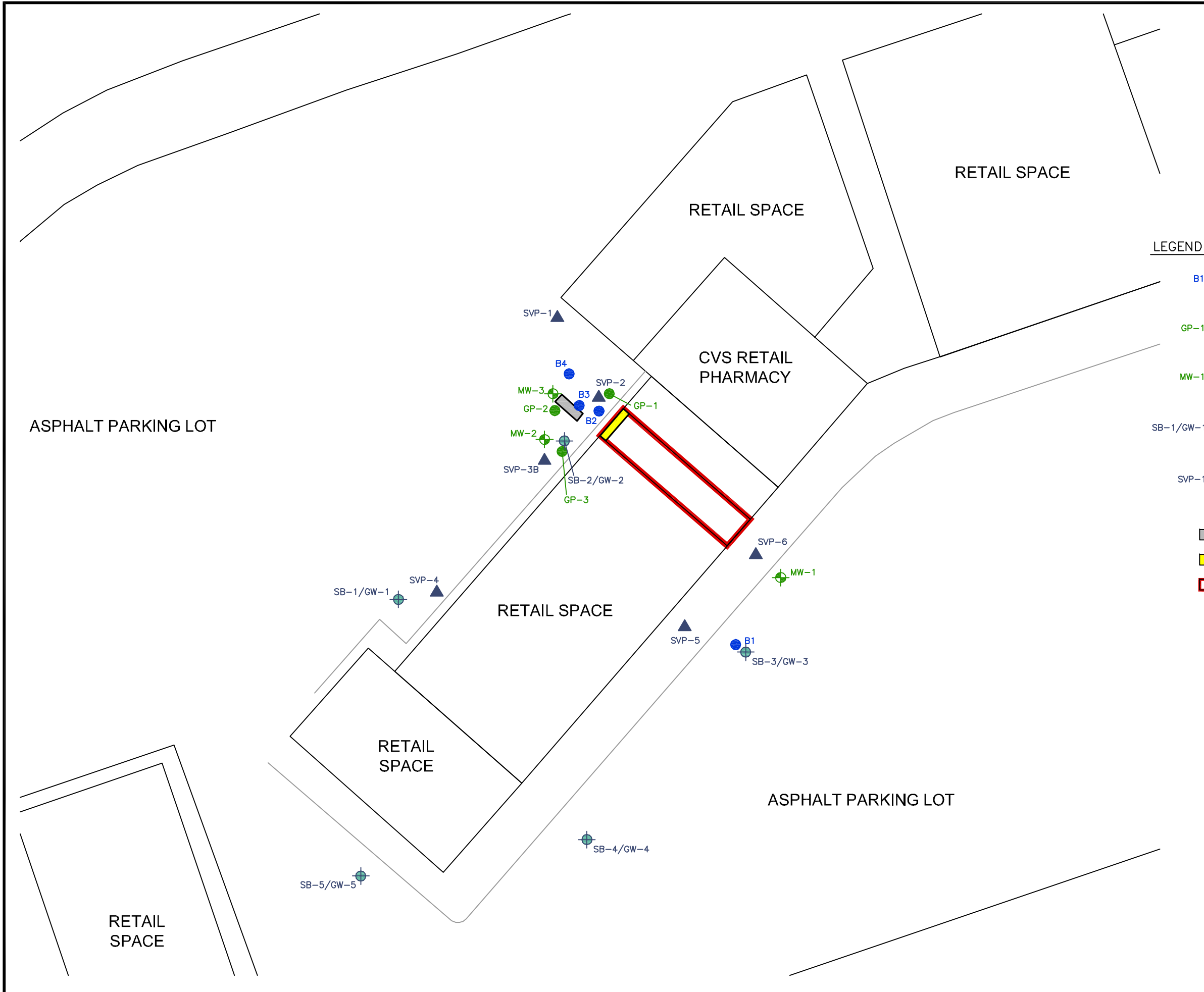
MORTON VILLAGE REALTY CO., INC

ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

Compiled by: J.W.	Date: 05JAN14
Prepared by: J.A.D.	Scale: AS SHOWN
Project Mgr.: J.W.	Project No.: 2517.0001Y000
File: 2517.0001Y101.01.CDR	

FIGURE

1

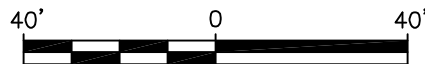


LEGEND

- B1 LOCATION AND DESIGNATION OF SOIL BORING INSTALLED BY GALDUN FRANKEL ENVIRONMENTAL IN 2006
- GP-1 LOCATION AND DESIGNATION OF SOIL BORING INSTALLED BY LEGGETTE, BRASHEARS & GRAHAM, INC IN 2007
- ⊕ MW-1 LOCATION AND DESIGNATION OF EXISTING MONITORING WELL INSTALLED BY LEGGETTE, BRASHEARS & GRAHAM, INC IN 2007
- ⊕ SB-1/GW-1 LOCATION AND DESIGNATION OF SOIL BORING-GROUNDWATER SAMPLE INSTALLED BY HRP ASSOCIATES IN 2010
- ▲ SVP-1 LOCATION AND DESIGNATION OF SOIL VAPOR SAMPLE INSTALLED BY HRP ASSOCIATES IN 2010
- APPROXIMATE LOCATION OF FORMER UST
- APPROXIMATE LOCATION OF FORMER SUMP
- FORMER MORTON VILLAGE CLEANERS LOCATION

SOURCE OF MAP

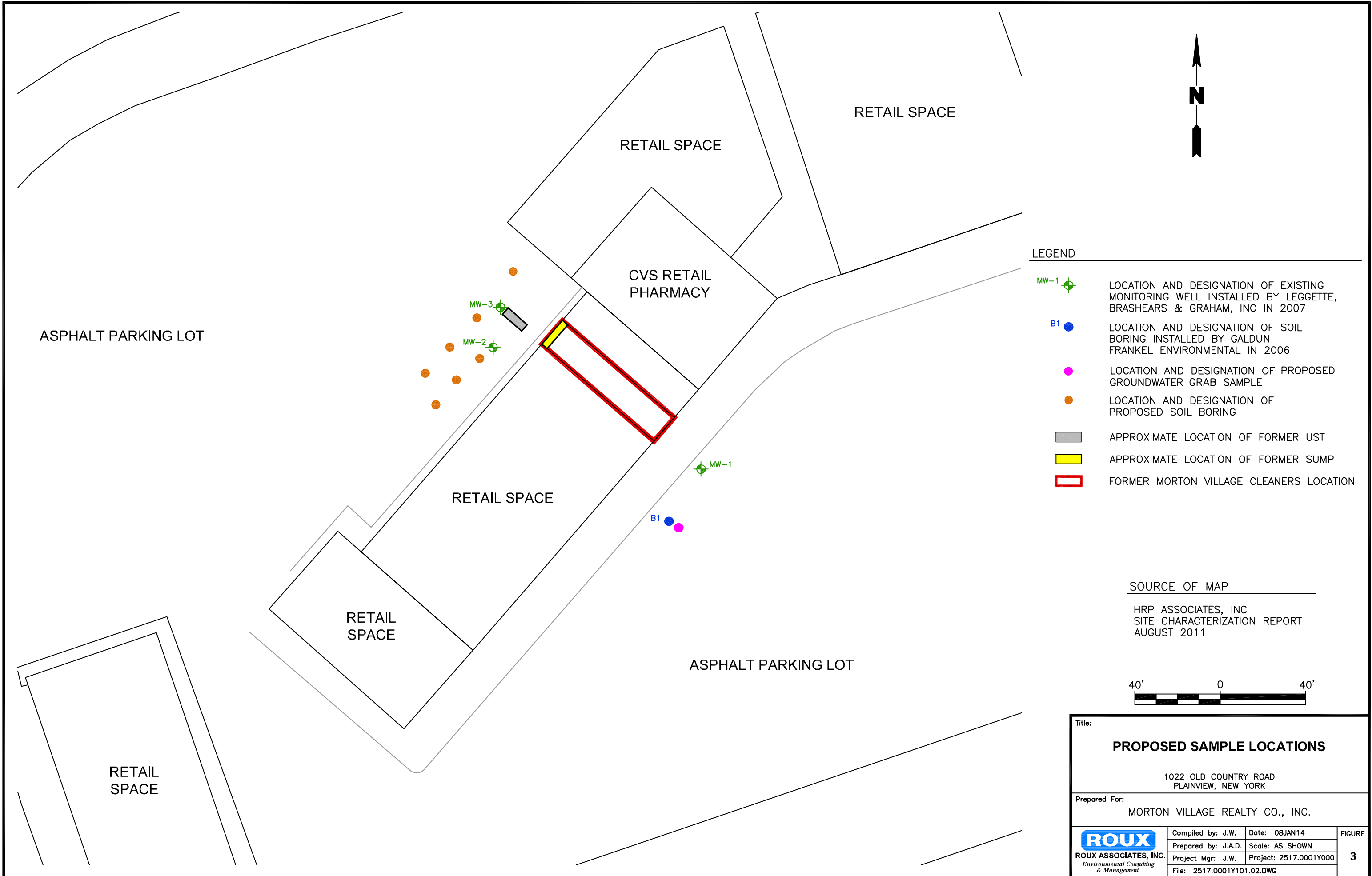
HRP ASSOCIATES, INC
SITE CHARACTERIZATION REPORT
AUGUST 2011



PREVIOUS SAMPLING LOCATIONS			
1022 OLD COUNTRY ROAD PLAINVIEW, NEW YORK			
Prepared For: MORTON VILLAGE REALTY CO., INC.			
 ROUX ASSOCIATES, INC. <i>Environmental Consulting & Management</i>	Compiled by: J.W.	Date: 08JAN14	FIGURE 2
	Prepared by: J.A.D.	Scale: AS SHOWN	
	Project Mgr: J.W.	Project: 2517.0001Y000	
File: 2517.0001Y101.02.DWG			

V:\CAD\PROJECTS\2517Y\0001Y\101\2517.0001Y101.02.DWG

V:\CAD\PROJECTS\2517Y\0001Y\101\2517.0001Y101.02.DWG

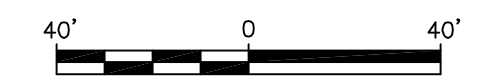


LEGEND

- MW-1 LOCATION AND DESIGNATION OF EXISTING MONITORING WELL INSTALLED BY LEGGETTE, BRASHEARS & GRAHAM, INC IN 2007
- B1 LOCATION AND DESIGNATION OF SOIL BORING INSTALLED BY GALDUN FRANKEL ENVIRONMENTAL IN 2006
- LOCATION AND DESIGNATION OF PROPOSED GROUNDWATER GRAB SAMPLE
- LOCATION AND DESIGNATION OF PROPOSED SOIL BORING
- APPROXIMATE LOCATION OF FORMER UST
- APPROXIMATE LOCATION OF FORMER SUMP
- FORMER MORTON VILLAGE CLEANERS LOCATION

SOURCE OF MAP

HRP ASSOCIATES, INC
 SITE CHARACTERIZATION REPORT
 AUGUST 2011



Title:			
PROPOSED SAMPLE LOCATIONS			
1022 OLD COUNTRY ROAD PLAINVIEW, NEW YORK			
Prepared For:			
MORTON VILLAGE REALTY CO., INC.			
 ROUX ASSOCIATES, INC. <i>Environmental Consulting & Management</i>	Compiled by: J.W.	Date: 08JAN14	FIGURE 3
	Prepared by: J.A.D.	Scale: AS SHOWN	
	Project Mgr: J.W.	Project: 2517.0001Y000	
	File: 2517.0001Y101.02.DWG		

**Remedial Investigation Work Plan
1022 Old Country Road, Plainview, New York 11803**

APPENDICES

- A. Field Sampling Plan
- B. Quality Assurance Project Plan
- C. Site Health and Safety Plan

**Remedial Investigation Work Plan
1022 Old Country Road, Plainview, New York 11803**

APPENDIX A

Field Sampling Plan

September 15, 2015

FIELD SAMPLING PLAN

**1022 Old Country Road
Plainview, New York 11803**

Prepared for

**MORTON VILLAGE REALTY COMPANY, INC.
% John Curran
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460 Park Avenue
New York, New York 10022**

ROUX ASSOCIATES, INC.

Environmental Consulting & Management



209 Shafter Street, Islandia, New York 11749 ♦ 631-232-2600

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ATTACHMENTS

1. Roux Associates' Standard Operating Procedure for Tasks Described in this Field Sampling Plan
2. Chain of Custody Form

1.0 INTRODUCTION

Roux Associates has developed this Field Sampling Plan (FSP) to describe in detail the field sampling methods to be used during performance of the Remedial Investigation (RI) for the site located at 1022 Old Country Road, Plainview, New York (Site). The focus of this RI Work Plan is on the former Morton Village Cleaners, a/k/a Classic French Cleaners, (former Cleaners) tenant space (1022 Old Country Road – currently occupied by a Subway restaurant) and on an area (asphalt parking lot) immediately north of the former Cleaners tenant space. The former Cleaners tenant space and parking lot area are collectively referred to as, Area of Concern 1 (AOC-1). The objective of the RI is to evaluate soil, groundwater and soil vapor (including sub-slab and indoor air) quality associated with AOC-1; evaluate the potential for impacts from suspected historical septic system (potential source of CVOCs in soil/groundwater) that was associated with the former Cleaners; and delineate the nature and extent of previously-documented CVOC impacts to soil, groundwater and soil vapor.

The FSP was prepared in accordance with directives provided in the DER-10 Technical Guidance for Site Investigation and Remediation (May 2010) issued by the New York State Department of Environmental Conservation (NYSDEC), and provides guidelines and procedures to be followed by field personnel during performance of the RI. Information contained in this FSP relates to sampling objectives, sampling locations, sampling frequencies, sample designations, sampling equipment, sample handling, sample analysis, and decontamination.

2.0 SAMPLING OBJECTIVES

Prior Site characterization work was conducted on the Site over the course of several years by various entities.

The objective of the proposed sampling is to determine the nature and extent of the known contamination on Site, to evaluate any additional AOCs (historic septic sanitary system) via geophysical survey and potential associated contamination, and to obtain a current representation of the environmental conditions at the Site.

The sampling procedures associated with characterization of soil, groundwater and soil vapor are discussed in detail in Section 4 of this FSP. A discussion of the data quality objectives (DQOs) is provided in the Quality Assurance Project Plan (QAPP) located in Appendix B of the RI Work Plan.

3.0 SAMPLE MEDIA, LOCATIONS, ANALYTICAL SUITES, AND FREQUENCY

The media to be sampled during the RI include soil, groundwater and soil vapor. Sampling locations, analytical suites, and frequency vary by medium. A discussion of the sampling schedule for each medium is provided below, while the assumed number of field samples to be collected for each medium, including quality control (QC) samples, is shown in Table 1. Specifics regarding the collection of samples at each location and for each task are provided in Section 4 of this FSP.

3.1 Soil Sampling

Soil samples underlying the Site will be collected at seven locations as shown in Figure 3 of the RI Work Plan. At each location, up to two soil samples will be collected: one soil sample will be collected from the interval that exhibits visual evidence of contamination or an elevated PID reading; and a second soil sample will be collected from the terminal depth of the boring (to be determined during field activities). All samples will be analyzed for Target Compound List (TCL) Volatile Organic Compounds (VOCs). The soil sampling rationale is summarized in Table 3 of the RI Work Plan.

Continuous soil samples will be collected using either the direct-push method via a Geoprobe[®] with a five-foot macrocore sampler or hollow stem auger (HSA). During soil boring activities, lithology will be recorded and soil will be field screened every two feet for VOCs using a PID.

As described in Section 3.2.2 of the RI Work Plan, soil borings locations may be adjusted based on findings from the geophysical survey.

3.2 Groundwater Sampling

Groundwater samples will be collected from three groundwater monitoring wells that will be installed during the RI based on soil field screening results as well as groundwater flow direction. Following gauging activities, each well will be sampled for TCL VOCs. Field parameters including pH, turbidity, conductivity, dissolved oxygen, oxygen reducing potential and temperature will also be measured prior to sampling. The groundwater sampling rationale is summarized in Table 4 of the RI Work Plan.

3.3 Soil Vapor Sampling

A soil vapor investigation will be conducted as part of Phase B of this RI, which will include the collection of soil vapor, sub-slab and indoor air samples. The number and location of the samples will be determined following the completion of Phase A of this RI. All soil vapor, sub-slab and indoor air samples will be analyzed for VOCs via USEPA Method TO-15. All sample locations will be discussed with and approved by the NYSDEC and NYSDOH prior to completion.

4.0 FIELD SAMPLING PROCEDURES

This section provides a detailed discussion of the field procedures to be used during sampling of the various media being evaluated as part of the RI (i.e., soil, groundwater and soil vapor). The soil and groundwater locations are shown on Figure 3 of the RI work plan and additional information including intervals to be sampled and sample rationale is provided in Tables 3 and 4 of the RI work plan.

4.1 Soil Sampling, Monitoring Well Installation/Sampling and Soil Vapor Sampling

Details for the collection of soil samples and the installation of monitoring wells, collection of groundwater samples and installation and sampling of soil vapor monitoring points (including sub-slab and indoor air sampling) are provided below.

4.1.1 Soil Sampling

Borings will be advanced using a Geoprobe[®] direct-push or HSA drill rig. Samples of the soil profile will be collected in continuous five-foot increments using a 2-inch diameter macrocore sampler or two-foot increments using a 2-inch diameter split spoon to a maximum depth of approximately 70-75 feet below grade, which is the anticipated depth to the water table.

The soil from each five-foot or two-foot interval will be observed for lithology and evidence of contamination (e.g., staining, odors, and/or visible free product) and placed immediately thereafter into large Zip-loc[™] bags for recording headspace. After a minimum of 15 minutes for equilibration with the headspace in the Zip-loc[™] bag, each sample will be screened for organic vapors using a PID. Samples for VOC analysis will be placed in a laboratory-supplied jar prior to screening, due to the potential for loss of VOCs through volatilization. Soil samples from the soil borings will be collected according to Table 3 of the RI Work Plan. In all soil borings, soil samples will be collected from the interval that that exhibits visual evidence of contamination or an elevated PID reading. A second soil sample will be collected from the terminal depth of the boring (to be determined during field activities). These samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux Associates Standard Operating Procedures (SOPs). Upon completion, each boring will be allowed to collapse. Any borings remaining open will be backfilled with bentonite hole-plug,

which will be hydrated with potable water. The surface at each location will be restored with an asphalt patch.

Additional details regarding soil-sampling protocols are described in Roux Associates' SOP for the Collection of Soil Samples for Laboratory Analysis, which is provided in Attachment 1.

4.1.2 Monitoring Well Installation

Following soil sampling activities, monitoring wells (RMW-1 and RMW-2) will be installed at the two soil borings with the greatest degree of evidence of contamination. Monitoring well RMW-3 will be installed as an upgradient well based on the groundwater flow direction observed during Phase A of this RI. RMW-1, RMW-2, and RMW-3 are proposed to be installed at a depth of approximately 70 to 90 feet below ground surface (ft-bgs). Monitoring wells will be constructed of 2-inch-inside-diameter, Schedule 40 polyvinyl chloride (PVC) casing and, 0.020-inch slot, machined screen. Well screens will be 20 feet long, and will be installed from approximately to 70 to 90 ft-bgs, depending upon the observed depth of the water table during drilling activities. A sand pack will be placed around the well screen, extending two feet above the top of the screened zone. Once the driller confirms the depth of the sand pack, a minimum two-foot-thick bentonite pellet seal will be placed above the sand pack. Once the pellets have been allowed to hydrate, a cement-bentonite grout will be pumped into the remaining annular space from the bottom up using a tremie pipe lowered to just above the bentonite seal. The wells will be completed using locking well plugs, and flush-mounted, bolt down, watertight, manhole covers cemented into place.

4.1.3 Groundwater Sampling

Each well will be developed to remove any fine-grained material in the vicinity of the well screen and to promote hydraulic connection with the aquifer. The wells will be developed using a submersible pump, which will be surged periodically until well yield is consistent and has a turbidity below 50 nephelometric turbidity units (NTUs), if possible.

Groundwater samples will be collected no sooner than one week following development of the wells. Prior to sampling, depth to water will be measured at each well using an electronic water level indicator with an accuracy of +/-0.01 feet. All wells will then be purged and sampled using a bladder pump, or an alternative method, depending on the observed depth to groundwater and

logistical issues. Samples will be analyzed for TCL VOCs. Additional details for the collection of groundwater samples are included in the Roux Associates SOPs (Attachment 1).

All groundwater samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with Roux Associates' SOPs.

4.1.4 Soil Vapor and Sub-Slab Installations

Soil vapor points will be installed by hand or with a Geoprobe[®]; pending NYSDEC/NYSDOH approval of the sampling locations and depths, based on historical data and Phase A findings. Soil vapor points will be constructed with a six-inch long, stainless steel, mess sample screen attached to Teflon lined polyurethane tubing. At each soil vapor point, the sample screens will be installed at the bottom of the established sample interval and coarse sand will be added to the annulus between the sample screen and borehole, and up to six-inches above the top of the sample screen in order to create a one foot sample zone. Bentonite will be added to the top of the sand and hydrated with potable water to seal the sample zone. The surface will be completed with a flush-mounted protective curb box.

Sub-slab soil vapor points will be installed hand tools. At each sub-slab soil vapor point, an approximate 0.5-inch hole will be drilled through the concrete slab to approximately six-inches below the slab, using a hand drill. A six-inch long, stainless steel, mess sample screen attached to Teflon lined polyurethane tubing will be installed at each sub-slab sample location. Coarse sand will be added to the annulus between the sample screen and borehole, and the surface will be sealed with bentonite or molding clay.

Soil vapor and sub-slab soil vapor will be collected no sooner than 24 hours following installation of the points.

4.1.5 Soil Vapor Sampling

All soil vapor, sub-slab and indoor air samples will be collected in accordance with the October 2006 NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York

(NYSDOH Guidance). Soil vapor and sub-slab samples will be collected utilizing the following procedural steps:

1. A clay seal will be placed around the sampling tubing in an effort to further minimize the infiltration of the atmospheric air present at land surface directly above the sampling point (ambient air).
2. The sampling tubing will be connected to a “T” connector three-way valve assembly, with one end of the “T” connector leading to a vacuum pump and the other end leading to a pre evacuated summa canister with a calibrated flow controller.
3. The soil vapor sample tubing and surrounding sand pack will be purged of approximately three volumes of air using a vacuum pump set at a rate of approximately 0.2 liters per minute.
4. A tracer gas (e.g., helium) will be used to enrich the atmosphere in the immediate vicinity of the sampling location where the sampling tubing intersected the ground surface in order to test the borehole seal and verify that ambient air is not inadvertently being drawn into the sample. A plastic container (i.e. bucket), with a soft seal, will be placed over the monitoring point and the helium will be injected into the bucket during purging of the monitoring point in an effort to enrich the interior of the bucket with the tracer gas. Note that the 3-way valve used to connect the sample tubing to the equipment will also be placed under a shroud (i.e., bucket enclosure) and included in the tracer gas verification. This will be done in an effort to ensure that the valve does not provide a means by which ambient air would enter the canister and possibly dilute the sample. Both the purge volume from the sample tubing (i.e., also the air that passed through the 3-way valve), and the helium enriched area within the bucket will be screened for the tracer gas. The gas will be measured with a MGD-2002 helium detector (by Dielectric) or equivalent meter, which measures the rate of helium leakage at the surface. If the screening results show that the rate of helium detected from the sampling tubing is greater than 10% of the helium detected in the enriched area (i.e., within the bucket), the seals around the sampling equipment will be reset and the sampling tubing will be re-purged until the tracer gas is no longer detected at levels greater than 10% of the enriched area.
5. Following the purging and tracer gas verification steps, the valve leading to the pump will be closed, the pump turned off, and the soil vapor directed to a 1-liter summa canister for sample collection. A laboratory-supplied, calibrated flow controller set for a 2-hour sample period (soil vapor samples) and an 8-hour sample period (sub-slab samples) will be used at each location, to restrict the sample collection rate to 0.2 liters per minute or less.

Indoor air samples will be collected using laboratory supplied 1-liter summa canisters and calibrated flow controller set for 8-hour sample period.

4.2 Geophysical Survey

A geophysical survey will be performed at the Site to attempt to locate the historic septic sanitary system and any additional previously unidentified AOC, as well as potential utility interference with the planned scope of work. Previous Site characterization work at the Site identified a former UST within the parking lot immediately north of the former Classic French Cleaners (AOC-1), which was removed in 2007. Roux Associates will target geophysical survey activities on areas that are previously uninvestigated within AOC-1 including the areas east and north of the former UST area.

5.0 SAMPLE HANDLING AND ANALYSIS

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

5.1 Field Sample Handling

A detailed discussion of the number and types of samples to be collected during each task, as well as the analyses to be performed can be found in Section 3.0 of this FSP. The types of containers, volumes needed, and preservation techniques for the aforementioned testing parameters are presented in Table 2.

5.2 Sample Custody Documentation

The purpose of documenting sample custody is to confirm that the integrity and handling of the samples is not subject to question. Sample custody will be maintained from the point of sampling through the analysis. Specific procedures regarding sample tracking from the field to the laboratory are described in Roux Associates' SOP for Sample Handling (Attachment 1).

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

All samples being shipped off-Site for analysis must be accompanied by a properly completed chain of custody form (Attachment D-2). The sample numbers will be listed on the chain of custody form. When transferring the possession of samples, individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to/from a secure storage area, and to the laboratory.

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

5.3 Sample Shipment

Laboratory courier services will be used for sample transport on this project. However, in the event that samples are shipped to the laboratory the following procedures will apply. Sample packaging and shipping procedures are based upon USEPA specifications, as well as U.S. Department of Transportation (DOT) regulations. The procedures vary according to potential sample analytes, concentration, and matrix, and are designed to provide optimum protection for the samples and the public. Sample packaging and shipment must be performed using the general outline described below. Additional information regarding sample handling is provided in Roux Associates' SOP for Sample Handling (Attachment 1).

All samples will be shipped within 12 hours of collection (when possible) and will be preserved appropriately from the time of sample collection. A description of the sample packing and shipping procedures is presented below:

1. Prepare cooler(s) for shipment.
 - Tape drain(s) of cooler shut;
 - Affix "This Side Up" arrow labels and "Fragile" labels on each cooler; and
 - Place mailing label with laboratory address on top of cooler(s).
2. Arrange sample containers in groups by sample number or analyte.
3. Ensure that all bottle labels are completed correctly. Place clear tape over bottle labels to prevent moisture accumulation from causing the label to peel off.
4. Arrange containers in front of assigned coolers.
5. Place packaging material at the bottom of the cooler to act as a cushion for the sample containers.
6. Arrange containers in the cooler so that they are not in contact with the cooler or other samples.
7. Fill remaining spaces with packaging material.
8. Ensure all containers are firmly packed with packaging material.

9. If ice is required to preserve the samples, ice cubes should be repackaged in double Zip-Lock™ bags, and placed on top of the packaging material.
10. Sign chain of custody form (or obtain signature) and indicate the time and date it was relinquished to Federal Express or other carrier, as appropriate.
11. Separate chain of custody forms. Seal proper copies within a large Zip-Lock™ bag and tape to cooler. Retain copies of all forms.
12. Close lid and latch.
13. Secure each cooler using custody seals.
14. Tape cooler shut on both ends.
15. Relinquish to Federal Express or other courier service as appropriate. Retain airbill receipt for project records. (Note: All samples will be shipped for “NEXT A.M.” delivery).
16. Telephone laboratory contact and provide him/her with the following shipment information:
 - sampler’s name;
 - project name;
 - number of samples sent according to matrix and concentration; and
 - airbill number.

6.0 SITE CONTROL PROCEDURES

Site control procedures, including decontamination and waste handling and disposal, are discussed below.

6.1 Decontamination

In an attempt to avoid the spread of contamination, all drilling and sampling equipment must be decontaminated at a reasonable frequency in a properly designed and located decontamination area. Detailed procedures for the decontamination of field and sampling equipment are included in Roux Associates' SOPs for the Decontamination of Field Equipment, which is provided in Attachment D-1. The location of the decontamination area will be determined prior to the start of field operations. The decontamination area will be constructed to ensure that all wash water generated during decontamination can be collected and containerized for proper disposal.

6.2 Waste Handling and Disposal

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

1. Remedial Investigation Field and Quality Control Sampling Summary
2. Preservation, Holding Times and Sample Containers

Table 1. Remedial Investigation Field and Quality Control Sampling Summary

Sample Medium	Target Analytes	Field Samples	Replicates¹	Trip Blanks²	Field Blanks³	Matrix Spikes¹	Spike Duplicates¹	Total No. of Samples
Soil	TCL VOCs	12	1	5	5	1	1	25
Groundwater	TCL VOCs	3	1	1	1	1	1	8
Soil Vapor ⁴	VOCs (TO-15)	TBD	TBD	0	0	0	0	TBD

¹ - Based on 1 per 20 samples or 1 per Sample Delivery Group (3 days max)

² - Based on 1 cooler per day

³ - Based on 1 per day

⁴ - Including sub-slab and indoor air

TCL - USEPA Contract Laboratory Program Target Compound List

VOCs - Volatile organic compounds

TBD - To be determined

Table 2. Preservation, Holding Times and Sample Containers

Analysis	Bottle Type	Preservation^(a)	Holding Time^(b)
<u>Target Compound List (TCL)</u>			
<i>Soil</i>			
TCL Volatile Organic Compounds (VOCs) SW-846 8260B	(3) 5 gram En Core Sampler	Cool to 4°C	48 hours from sample collection
<i>Groundwater</i>			
TCL VOCs 8260	(3) 40 mL Vials with telfon-lined cap	Cool to 4°C	14 days to extract, 40 days to analysis
<i>Soil Vapor</i>			
VOCs TO-15	(1) 1-liter Summa Canister	None	30 days from sample collection

^(a) All soil and groundwater samples to be preserved in ice during collection and transport

^(b) Days from date of sample collection.

1. Roux Associates' Standard Operating Procedure for Tasks Described in this Field Sampling Plan
2. Chain of Custody Form

**Roux Associates' Standard Operating Procedure for
Tasks Described in this Field Sampling Plan**

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for the sampling of ground-water monitoring wells for dissolved constituents. As part of the SOP for the sampling of ground-water monitoring wells, sample collection equipment and devices must be considered, and equipment decontamination and pre-sampling procedures (e.g., measuring water levels, sounding wells, and purging wells) must be implemented. Sampling objectives must be firmly established in the work plan before considering the above.

Valid water-chemistry data are integral to a hydrogeologic investigation that characterizes ground-water quality conditions. Water-quality data are used to evaluate both current and historic aquifer chemistry conditions, as well as to estimate future conditions (e.g., trends, migration pathways). Water-quality data can be used to construct ground-water quality maps to illustrate chemical conditions within the flow system, to generate water-quality plots to depict conditions with time and trends, and to perform statistical analyses to quantify data variability, trends, and cleanup levels.

2.0 EQUIPMENT AND MATERIALS

2.1 In order to sample ground water from monitoring wells, specific equipment and materials are required. The equipment and materials list may include, but not necessarily be limited to, the following:

- a. Bailers (Teflon™ or stainless steel).
- b. Pumps (centrifugal, peristaltic, bladder, electric submersible, bilge, hand-operated diaphragm, etc.).
- c. Gas-displacement device(s).
- d. Air-lift device(s).
- e. Teflon™ tape, electrical tape.
- f. Appropriate discharge hose.
- g. Appropriate discharge tubing (e.g., polypropylene, teflon, etc.) if using a peristaltic pump.
- h. Appropriate compressed gas if using bladder-type or gas-displacement device.

STANDARD OPERATING PROCEDURE 4.4
FOR SAMPLING GROUND-WATER MONITORING
WELLS FOR DISSOLVED CONSTITUENTS

- i. Portable generator and gasoline or alternate power supply if using an electric submersible pump.
- j. Non-absorbent cord (e.g., polypropylene, etc.).
- k. Plastic sheeting.
- l. Tape measure (stainless steel, steel, fiberglass) with 0.01-foot measurement increments and chalk (blue carpenter's).
- m. Electronic water-level indicators (e.g., m-scope, etc.) or electric water-level/product level indicators.
- n. Non-phosphate, laboratory-grade detergent.
- o. Distilled/Deionized water.
- p. Potable water.
- q. Paper towels, clean rags.
- r. Roux Associates' field forms (e.g., daily log, well inspection checklist, sampling, etc.) and field notebook.
- s. Well location and site map.
- t. Well keys.
- u. Stop watch, digital watch with second increments, or watch with a second hand.
- v. Water Well Handbook.
- w. Calculator.
- x. Black pen and water-proof marker.
- y. Tools (e.g., pipe wrenches, screwdrivers, hammer, pliers, flashlight, pen knife, etc.).
- z. Appropriate health and safety equipment, as specified in the site health and safety plan (HASP).
- aa. pH meter(s) and buffers.
- bb. Conductivity meter(s) and standards.
- cc. Thermometer(s).

- dd. Extra batteries (meters, thermometers, flashlight).
- ee. Filtration apparatus, filters, pre-filters.
- ff. Plasticware (e.g., premeasured buckets, beakers, flasks, funnels).
- gg. Disposable gloves.
- hh. Water jugs.
- ii. Laboratory-supplied sample containers with labels.
- jj. Cooler(s).
- kk. Ice (wet, blue packs).
- ll. Masking, duct, and packing tape.
- mm. Chain-of-custody form(s) and custody seal(s).
- nn. Site sampling and analysis plan (SAP).
- oo. Site health and safety plan (HASP).
- pp. Packing material (e.g., bubble wrap)
- qq. "Zip-lock" plastic bags.
- rr. Overnight (express) mail forms.

3.0 DECONTAMINATION

- 3.1 Make sure all equipment is decontaminated and cleaned before use (refer to the SOP for Decontamination of Field Equipment for detailed decontamination methods, summaries for bailers and pumps are provided below). Use new, clean materials when decontamination is not appropriate (e.g., non-absorbent cord, disposable gloves). Document, and initial and date the decontamination procedures on the appropriate field form and in the field notebook.
- a. Decontaminate a bailer by: 1) wearing disposable gloves, 2) disassembling (if appropriate) and scrubbing in a non-phosphate, laboratory-grade detergent and distilled/deionized water solution, and 3) rinsing first with potable water and then distilled/deionized water.
 - b. Decontaminate a pump by: 1) wearing disposable gloves, 2) flushing the pump and discharge hose (if not disposable) first with a non-phosphate, laboratory-grade detergent and potable water solution in an appropriate

container (clean bucket, garbage can, or 55-gallon drum) and then with distilled/deionized water or potable water, and 3) wiping pump-related equipment (e.g., electrical lines, cables, discharge hose) first with a clean cloth and detergent solution and then rinsing or wiping with a clean cloth and distilled/deionized water or potable water.

- 3.2 Note that the decontamination procedures for bailers and pumps are the minimum that must be performed. Check the work plan to determine if chemicals specified by individual state regulatory agencies must also be used for decontamination procedures (e.g., hexane, nitric acid, acetone, isopropanol, etc.).

4.0 CALIBRATION OF FIELD ANALYSIS EQUIPMENT

Calibrate field analysis equipment before use (e.g., thermometers, pH and conductivity meters, etc.). Refer to the specific SOP for field analysis for each respective piece of equipment. Document, and initial and date the calibration procedures on the appropriate field form, in the field notebook, and in the calibration log book.

5.0 PROCEDURE

- 5.1 Document, and initial and date well identification, pre-sampling information, and problems encountered on the appropriate field form and in the field notebook as needed.
- 5.2 Inspect the protective casing of the well and the well casing, and note any items of concern such as a missing lock, or bent or damaged casing(s).
- 5.3 Place plastic sheeting around the well to protect sampling equipment from potential cross contamination.
- 5.4 Remove the well cap or plug and, if necessary, clean the top of the well off with a clean rag. Place the cap or plug on the plastic sheeting. If the well is not vented, allow several minutes for the water level in the well to equilibrate. If fumes or gases are present, then diagnose these with the proper safety equipment. Never inhale the vapors.
- 5.5 Measure the depth to water (DTW) from the measuring point (MP) on the well using a steel tape and chalk or an electronic sounding device (m-scope). Refer to the specific SOPs for details regarding the use of a steel tape or a m-scope for measuring water levels. Calculate the water-level elevation. Document, and initial and date the information on the appropriate field form and in the field notebook.
- 5.6 Measuring the total depth of the well from the MP with a weighted steel tape. Calculate and record the volume of standing water in the well casing on the appropriate field form and in the field notebook.

- 5.7 Decontaminate the equipment used to measure the water level and sound the well with a non-phosphate, laboratory-grade detergent solution followed by a distilled/deionized water rinse.
- 5.8 Purge the well prior to sampling (refer to the SOP for Purging a Well). The well should be pumped or bailed to remove the volume of water specified in the work plan. Usually three to five casing volumes are removed if the recharge rate is adequate to accomplish this within a reasonable amount of time.

If the formation cannot produce enough water to sustain purging, then one of two options must be followed. These include: 1) pumping or bailing the well dry, or 2) pumping or bailing the well to "near-dry" conditions (i.e., leaving some water in the well). The option employed must be specified in the work plan and be in accordance with regulatory requirements.

If the well is purged dry, then all the standing water has been removed and upon recovery the well is ready for sampling. However, depending on the rate of recovery and the time needed to complete the sampling round, one of the following procedures may have to be implemented: 1) the well may have to be sampled over a period of more than one day; 2) the well may not yield enough water to collect a complete suite of samples and only select (most important) samples will be collected; or 3) the well may not recover which will preclude sampling. Regardless of the option that must be followed, the sampling procedure must be fully documented. When preparing to conduct a sampling round, review drilling, development and previous sampling information (if available) to identify low-yielding wells in order to purge them first, and potentially allow time for the well to recover for sampling.

- 5.9 Record the physical appearance of the water (i.e., color, turbidity, odor, etc.) on the appropriate field form and in the field notebook, as it is purged. Note any changes that occur during purging.
- 5.10 If a bailer is used to collect the sample, then:
- a. Flush the decontaminated bailer three times with distilled/deionized water.
 - b. Tie the non-absorbent cord (polypropylene) to the bailer with a secure knot and then tie the free end of the bailer cord to the protective casing or, if possible, some nearby structure to prevent losing the bailer and cord down the well.
 - c. Lower the bailer slowly down the well and into the water column to minimize disturbance of the water surface. If a bottom-filling bailer is used, then do not submerge the top of the bailer; however, if a top-filling bailer is used, then submerge the bailer several feet below the water surface.

- d. Remove and properly discard one bailer volume from the well to rinse the bailer with well water before sampling. Again, lower the bailer slowly down the well to the appropriate depth depending on the bailer type (as discussed above in 5.11 c). When removing the bailer from the well, do not allow the bailer cord to rest on the ground but coil it on the protective plastic sheeting placed around the well. Certain regulatory agencies require that the first bailer volume collected be utilized for the samples.
- 5.11 If a pump is used to collect the sample, then use the same pump used to purge the well and, if need be, reduce the discharge rate to facilitate filling sample containers and to avoid problems that can occur while filling sample containers (as listed in Number 5.14, below). Alternately, the purge pump may be removed and a thoroughly decontaminated bailer can be used to collect the sample.
- 5.12 Remove each appropriate container's cap only when ready to fill each with the water sample, and then replace and secure the cap immediately.
- 5.13 Fill each appropriate, pre-labeled sample container carefully and cautiously to prevent: 1) agitating or creating turbulence; 2) breaking the container; 3) entry of, or contact with, any other medium; and 4) spilling/splashing the sample and exposing the sampling team to contaminated water. Immediately place the filled sample container in a ice-filled (wet ice or blue pack) cooler for storage. If wet ice is used it is recommended that it be repackaged in zip-lock bags to help keep the cooler dry and the sample labels secure. Check the work plan as to whether wet ice or blue packs are specified for cooling the samples because certain regulatory agencies may specify the use of one and not the other.
- 5.14 "Top-off" containers for volatile organic compounds (VOCs) and tightly seal with Teflon™-lined septums held in place by open-top screw caps to prevent volatilization. Ensure that there are no bubbles by turning the container upside down and tapping it gently.
- 5.15 Filter water samples (Procedure 4.6) collected for dissolved metals analysis prior to preservation to remove the suspended sediment from the sample. If water samples are to be collected for total metals analysis, then collect a second set of samples without field filtering.

In the event that the regulatory agency(ies) want unfiltered samples for metals analysis, a second set of filtered samples should also be collected. Because unfiltered samples are indications of total metals (dissolved and suspended) they are not representative of aquifer conditions because ground water does not transport sediment (except in some rare cases). Thus, the results for dissolved metals in ground water should be based on filtered samples even if both filtered and unfiltered sets are presented in a report.

- 5.16 Add any necessary preservative(s) to the appropriate container(s) prior to, or after (preferred), the collection of the sample, unless the appropriate preservative(s) have already been added by the laboratory before shipment.
- 5.17 Collect quality control (QC) samples as required in the work plan to monitor sampling and laboratory performance. Refer to the SOP for Collection of Quality Control Samples.
- 5.18 Conduct field analyses after sample collection is complete by measuring and recording the temperature, conductivity, pH, etc. (as called for in the work plan). Note and record the "final" physical appearance of the water (after purging and sampling) on an appropriate field form and in the field notebook.
- 5.19 Wipe the well cap with a clean rag, replace the well cap and protective cover (if present). Lock the protective cover.
- 5.20 Verify that each sample is placed in an individual "zip-lock" bag, wrapped with "bubble wrap," placed in the cooler, and that the cooler has sufficient ice (wet ice or blue packs) to preserve the samples for transportation to the analytical laboratory.
- 5.21 Decontaminate bailers, hoses, and pumps as discussed in the decontamination SOP. Wrap decontaminated equipment with a suitable material (e.g., clean plastic bag or aluminum foil). Discard cords, rags, gloves, etc. in a manner consistent with site conditions.
- 5.22 Complete all necessary field forms, field notebook entries, and the chain-of-custody forms. Retain one copy of each chain-of-custody form. Secure the cooler with sufficient packing tape and a custody seal.
- 5.23 Samples collected from Monday through Friday will be delivered within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Consult the work plan to determine if any of the analytes require a shorter delivery time.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this Standard Operating Procedure (SOP) is to establish guidelines for the collection of soil samples for laboratory analysis. This SOP is applicable to soil samples collected from split-spoon samplers during drilling, hand auger samples, grab samples from stockpiled soils, surface samples, test pit samples, etc.

2.0 CONSIDERATIONS

Soil samples may be collected in either a random or biased manner. Random samples can be based on a grid system or statistical methodology. Biased samples can be collected in areas of visible impact or suspected source areas. Soil samples can be collected at the surface, shallow subsurface, or at depth. When samples are collected at depth the water content should be noted, since generally "soil sampling" is restricted to the unsaturated zone. Equipment selection will be determined by the depth of the sample to be collected. A thorough description of the sampling locations and proposed methods of sample collection should be included in the work plan.

Commonly, surface sampling refers to the collection of samples at a 0 to 6 inch depth interval. Certain regulatory agencies may define the depth interval of a surface sample differently, and this must be defined in the work plan. Collection of surface soil samples is most efficiently accomplished with the use of a stainless steel trowel or scoop. For samples at greater depths a decontaminated bucket auger or power auger may be needed to advance the hole to the point of sample collection. Another clean bucket auger should then be used to collect the sample. To collect samples at depths of greater than approximately six feet the use of a drill rig and split spoon samples will usually be necessary. In some situations, sample locations are accessed with the use of a backhoe.

3.0 MATERIALS/EQUIPMENT

- a. A work plan which outlines soil sampling requirements.
- b. Field notebook, field form(s), maps, chain-of-custody forms, and custody seals.
- c. Decontamination supplies (including: non-phosphate, laboratory grade detergent, buckets, brushes, potable water, distilled water, regulatory-required reagents, aluminum foil, plastic sheeting, etc.).
- d. Sampling device (split-spoon sampler, stainless steel hand auger, stainless steel trowel, etc.).
- e. Stainless steel spoons or spatulas.
- f. Disposable sampling gloves.

- g. Laboratory-supplied sample containers with labels.
- h. Cooler with blue or wet ice.
- i. Plastic sheeting.
- j. Black pen and indelible marker.
- k. Zip-lock bags and packing material.
- l. Tape measure.
- m. Paper towels or clean rags.
- n. Masking and packing tape.
- o. Overnight (express) mail forms.

4.0 DECONTAMINATION

All reusable sampling equipment will be thoroughly cleaned according to the decontamination SOP. Where possible, thoroughly pre-cleaned and wrapped sampling equipment should be used and dedicated to individual sampling locations. Disposable items such as sampling gloves, aluminum foil, and plastic sheeting will be changed after each use and discarded in an appropriate manner.

5.0 PROCEDURE

- 5.1 Prior to collecting soil samples, ensure that all sampling equipment has been thoroughly cleaned according to the decontamination SOP. If samples are to be collected at depth, then the boring must be advanced with thoroughly cleaned equipment to the desired sampling horizon and a different thoroughly cleaned sampler must be used to collect the sample.
- 5.2 Using disposable gloves and a pre-cleaned, stainless steel spatula or spoon, extract the soil sample from the sampler, measure the recovery, and separate the wash from the true sample. Where allowed by regulatory agency(ies), disposable plastic spoons may be used.
- 5.3 Place the sample in a laboratory-supplied, pre-cleaned sample container. This should be done as quickly as possible and this is especially important when sampling for volatile organic compounds (VOCs). Samples to be analyzed for VOCs must be collected prior to other constituents.
- 5.4 The sample container will be labeled with appropriate information such as, client name, site location, sample identification (location, depth, etc.), date and time of collection, and sampler's initials.

- 5.5 Using the remaining portion of soil from the sampler, log the sample in detail and record sediment characteristics (color, odor, moisture, texture, density, consistency, organic content, layering, grain size, etc.).
- 5.6 If soil samples are to be composited in the field, then equal portions from selected locations will be placed on a clean plastic sheet and homogenized. Alternately, several samples may be submitted to the laboratory for compositing by weight. The method used is dependent upon regulatory requirements. Specific compositing procedures shall be approved by the appropriate regulatory agency and described in the work plan. Samples to be analyzed for VOCs will not be composited unless required by a regulatory agency.
- 5.7 After the sample has been collected, labeled, and logged in detail, it is placed in a zip-lock bag and stored in a cooler at 4°C.
- 5.8 A chain-of-custody form is completed for all samples collected. One copy is retained and two are sent with the samples in a zip-lock bag to the laboratory. A custody seal is placed on the cooler prior to shipment.
- 5.9 Samples collected from Monday to Friday are to be delivered to the laboratory within 24 hours of collection. If Saturday delivery is unavailable, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if any analytes require a shorter delivery time.
- 5.10 The field notebook and appropriate forms should include, but not be limited to the following: client name, site location, sample location, sample depth, sample identification, date and time collected, sampler's name, method of sample collection, number and type of containers, geologic description of material, description of decontamination procedures, etc. A site map should be prepared with exact measurements to each sample location in case follow-up sampling is necessary.
- 5.11 All reusable sampling equipment must be thoroughly cleaned in accordance with the decontamination SOP. Following the final decontamination (after all samples are collected) the sampling equipment is wrapped in aluminum foil. Discard any gloves, foil, plastic, etc. in an appropriate manner that is consistent with site conditions.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

The purpose of this standard operating procedure (SOP) is to establish guidelines for sample handling which will allow consistent and accurate results. Valid chemistry data are integral to investigations that characterize media-quality conditions. Thus, this SOP is designed to ensure that once samples are collected, they are preserved, packed and delivered in a manner which will maintain sample integrity to as great an extent as possible. The procedures outlined are applicable to most sampling events and any required modifications must be clearly described in the work plan.

2.0 CONSIDERATIONS

Sample containers, sampling equipment decontamination, quality assurance/quality control (QA/QC), sample preservation, and sample handling are all components of this SOP.

2.1 Sample Containers

Prior to collection of a sample, considerations must be given to the type of container that will be used to store and transport the sample. The type and number of containers selected is usually based on factors such as sample matrix, potential contaminants to be encountered, analytical methods requested, and the laboratory's internal quality assurance requirements. In most cases, the overriding considerations will be the analytical methodology, or the state or federal regulatory requirements because these regulations generally encompass the other factors. The sample container selected is usually based on some combination of the following criteria:

a. Reactivity of Container Material with Sample

Choosing the proper composition of sample containers will help to ensure that the chemical and physical integrity of the sample is maintained. For sampling potentially hazardous material, glass is the recommended container type because it is chemically inert to most substances. Plastic containers are not recommended for most hazardous wastes because the potential exists for contaminants to adsorb to the surface of the plastic or for the plasticizer to leach into the sample.

In some instances, however, the sample characteristics or analytes of interest may dictate that plastic containers be used instead of glass. Because some metals species will adhere to the sides of the glass containers in an aqueous matrix, plastic bottles (e.g., nalgene) must be used for samples collected for metals analysis. A separate, plastic

container should accompany glass containers if metals analysis is to be performed along with other analyses. Likewise, other sample characteristics may dictate that glass cannot be used. For example, in the case of a strong alkali waste or hydrofluoric solution, plastic containers may be more suitable because glass containers may be etched by these compounds and create adsorptive sites on the container's surface.

b. Volume of the Container

The volume of sample to be collected will be dictated by the analysis being performed and the sample matrix. The laboratory must supply bottles of sufficient volume to perform the required analysis. In most cases, the methodology dictates the volume of sample material required to complete the analysis. However, individual laboratories may provide larger volume containers for various analytes to ensure sufficient quantities for duplicates or other QC checks.

To facilitate transfer of the sample from the sampler into the container and to minimize spillage and sample disturbance, wide-mouth containers are recommended. Aqueous volatile organic samples must be placed into 40-milliliter (ml) glass vials with polytetrafluoroethylene (PTFE) (e.g., Teflon™) septums. Non-aqueous volatile organic samples should be collected in the same type of vials or in 4-ounce (oz) wide-mouth jars provided by the laboratory. These jars should have PTFE-lined screw caps.

c. Color of Container

Whenever possible, amber glass containers should be used to prevent photodegradation of the sample, except when samples are being collected for metals analysis. If amber containers are not available, then containers holding samples should be protected from light (i.e., place in cooler with ice immediately after filling).

d. Container Closures

Container closures must screw on and off the containers and form a leak-proof seal. Container caps must not be removed until the container is ready to be filled with the sample, and the container cap must be replaced (securely) immediately after filling it. Closures should be constructed of a material which is inert with respect to the sampled material, such as PTFE (e.g., Teflon™). Alternately, the closure may be separated from the sample by a closure liner that is inert to the sample material such as PTFE sheeting. If soil or sediment samples are being collected, the threads of the container must be wiped clean with a dedicated paper towel or cloth so the cap can be threaded properly.

e. Decontamination of Sample Containers

Sample containers must be laboratory cleaned by the laboratory performing the analysis. The cleaning procedure is dictated by the specific analysis to be performed on the sample. Sample containers must be carefully examined to ensure that all containers appear clean. Do not mistake the preservative as unwanted residue. The bottles should not be field cleaned. If there is any question regarding the integrity of the bottle, then the laboratory must be contacted immediately and the bottle(s) replaced.

f. Sample Bottle Storage and Transport

No matter where the sample bottles are, whether at the laboratory waiting to be packed for shipment or in the field waiting to be filled with sample, care must be taken to avoid contamination. Sample shuttles or coolers, and sample bottles must be stored and transported in clean environments. Sample bottles and clean sampling equipment must never be stored near solvents, gasoline, or other equipment that is a potential source of cross-contamination. When under chain of custody, sample bottles must be secured in locked vehicles, and custody sealed in shuttles or in the presence of authorized personnel. Information which documents that proper storage and transport procedures have been followed must be included in the field notebook and on appropriate field forms.

2.2 Decontamination of Sampling Equipment

Proper decontamination of all re-usable sampling equipment is critical for all sampling episodes. The SOP for Decontamination of Field Equipment and SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for decontamination of various types of equipment.

2.3 Quality Assurance/Quality Control Samples

QA/QC samples are intended to provide control over the proper collection and tracking of environmental measurements, and subsequent review, interpretation and validation of generated analytical data. The SOPs for Collection of Quality Control Samples, for Evaluation and Validation of Data, and for Field Record Keeping and Quality Assurance/Quality Control must be referred to for detailed guidance regarding these respective procedures. SOPs for method-specific or instrument-specific tasks must also be referred to for guidance for QA/QC procedures.

2.4 Sample Preservation Requirements

Certain analytical methodologies for specific analytes require chemical additives in order to stabilize and maintain sample integrity. Generally, this is accomplished under the following two scenarios:

- a. Sample bottles are preserved at the laboratory prior to shipment into the field.
- b. Preservatives are added in the field immediately after the samples are collected.

Many laboratories provide pre-preserved bottles as a matter of convenience and to help ensure that samples will be preserved immediately upon collection. A problem associated with this method arises if not enough sample could be collected, resulting in too much preservative in the sample. More commonly encountered problems with this method include the possibility of insufficient preservative provided to achieve the desired pH level or the need for additional preservation due to chemical reactions caused by the addition of sample liquids to pre-preserved bottles. The use of pre-preserved bottles is acceptable; however, field sampling teams must always be prepared to add additional preservatives to samples if the aforementioned situations occur. Furthermore, care must be exercised not to overfill sample bottles containing preservatives to prevent the sample and preservative from spilling and therefore diluting the preservative (i.e., not having enough preservative for the volume of sample).

When samples are preserved after collection, special care must be taken. The transportation and handling of concentrated acids in the field requires additional preparation and adherence to appropriate preservation procedures. All preservation acids used in the field should be trace-metal or higher-grade.

2.5 Sample Handling

After the proper sample bottles have been received under chain-of-custody, properly decontaminated equipment has been used to collect the sample, and appropriate preservatives have been added to maintain sample integrity, the final step for the field personnel is checking the sample bottles prior to proper packing and delivery of the samples to the laboratory.

All samples should be organized and the labels checked for accuracy. The caps should be checked for tightness and any 40-ml volatile organic compound (VOC) bottles must be checked for bubbles. Each sample bottle must be placed in an individual "zip-lock" bag to protect the label, and placed on ice. The bottles must be carefully packed to prevent breakage during transport. When several bottles have been collected for an individual sample, they should not be placed adjacent to each other in the cooler to prevent possible breakage of all bottles for a given sample. If there are any samples which are known or suspected to be highly

contaminated, these should be placed in an individual cooler under separate chain-of-custody to prevent possible cross contamination. Sufficient ice (wet or blue packs) should be placed in the cooler to maintain the temperature at 4 degrees Celsius (°C) until delivery at the laboratory. Consult the work plan to determine if a particular ice is specified as the preservation for transportation (e.g., the United States Environmental Protection Agency does not like the use of blue packs because they claim that the samples will not hold at 4°C). If additional coolers are required, then they should be purchased. The chain-of-custody form should be properly completed, placed in a "zip-lock" bag, and placed in the cooler. One copy must be maintained for the project files. The cooler should be sealed with packing tape and a custody seal. The custody seal number should be noted in the field book. Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time. If overnight mail is utilized, then the shipping bill must be maintained for the files and the laboratory must be called the following day to confirm receipt.

3.0 EQUIPMENT AND MATERIALS

- 3.1 General equipment and materials may include, but not necessarily be limited to, the following:
- a. Sample bottles of proper size and type with labels.
 - b. Cooler with ice (wet or blue pack).
 - c. Field notebook, appropriate field form(s), chain-of-custody form(s), custody seals.
 - d. Black pen and indelible marker.
 - e. Packing tape, "bubble wrap," and "zip-lock" bags.
 - f. Overnight (express) mail forms and laboratory address.
 - g. Health and safety plan (HASP).
 - h. Work plan/scope of work.
 - i. Pertinent SOPs for specified tasks and their respective equipment and materials.
- 3.2 Preservatives for specific samples/analytes as specified by the laboratory. Preservatives must be stored in secure, spillproof glass containers with their content, concentration, and date of preparation and expiration clearly labeled.

- 3.3 Miscellaneous equipment and materials including, but not necessarily limited to, the following:
- a. Graduated pipettes.
 - b. Pipette bulbs.
 - c. Litmus paper.
 - d. Glass stirring rods.
 - e. Protective goggles.
 - f. Disposable gloves.
 - g. Lab apron.
 - h. First aid kit.
 - i. Portable eye wash station.
 - j. Water supply for immediate flushing of spillage, if appropriate.
 - k. Shovel and container for immediate containerization of spillage-impacted soils, if appropriate.

4.0 PROCEDURE

- 4.1 Examine all bottles and verify that they are clean and of the proper type, number, and volume for the sampling to be conducted.
- 4.2 Label bottles carefully and clearly with project name and number, site location, sample identification, date, time, and the sampler's initials using an indelible marker.
- 4.3 Collect samples in the proper manner (refer to specific sampling SOPs).
- 4.4 Conduct preservation activities as required after each sample has been collected. Field preservation must be done immediately and must not be done later than 30 minutes after sample collection.
- 4.5 Conduct QC sampling, as required.
- 4.6 Seal each container carefully and place in an individual "zip lock" bag.
- 4.7 Organize and carefully pack all samples in the cooler immediately after collection (e.g., bubble wrap). Insulate samples so that breakage will not occur.

- 4.8 Complete and place the chain-of-custody form in the cooler after all samples have been collected. Maintain one copy for the project file. If the cooler is to be transferred several times prior to shipment or delivery to the laboratory, it may be easier to tape the chain-of-custody to the exterior of the sealed cooler. When exceptionally hazardous samples are known or suspected to be present, this should be identified on the chain-of-custody as a courtesy to the laboratory personnel.
- 4.9 Add additional ice as necessary to ensure that it will last until receipt by the laboratory.
- 4.10 Seal the cooler with packing tape and a custody seal. Record the number of the custody seal in the field notebook and on the field form. If there are any exceptionally hazardous samples, then shipping regulations should be examined to ensure that the sample containers and coolers are in compliance and properly labeled.
- 4.11 Samples collected from Monday through Friday will be delivered to the laboratory within 24 hours of collection. If Saturday delivery is not available, samples collected on Friday must be delivered by Monday morning. Check the work plan to determine if certain analytes require a shorter delivery time.
- 4.12 Maintain the shipping bill for the project files if overnight mail is utilized and call the laboratory the following day to confirm receipt.

END OF PROCEDURE

Date: May 5, 2000

1.0 PURPOSE

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

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

2.0 PROCEDURE FOR DRILLING EQUIPMENT

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

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

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

3.0 PROCEDURE FOR SOIL-SAMPLING EQUIPMENT

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

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

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

4.0 PROCEDURE FOR WATER-SAMPLING EQUIPMENT

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

4.1 Decontamination procedures for bailers follow:

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

4.2 Decontamination procedures for pumps follow:

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

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

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

Chain of Custody Form



CHAIN OF CUSTODY

Nº 11332 Y

ROUX ASSOCIATES, INC. <i>Environmental Consulting & Management</i>				209 SHAFTER STREET ISLANDIA, NEW YORK 11749-5074 (631) 232-2600 FAX: (631) 232-9898				ANALYSES				PAGE	OF
PROJECT NAME				PROJECT NUMBER				SAMPLE MATRIX				TOTAL BOTTLES	
PROJECT LOCATION													
PROJECT MANAGER				SAMPLER(S)				ANALYSES				NOTES	
SAMPLE DESIGNATION / LOCATION		DATE COLLECTED		TIME COLLECTED									
RELINQUISHED BY: (SIGNATURE)		FOR		DATE	TIME	SEAL INTACT Y OR N	RECEIVED BY: (SIGNATURE)		FOR		DATE	TIME	SEAL INTACT Y OR N
RELINQUISHED BY: (SIGNATURE)		FOR		DATE	TIME	SEAL INTACT Y OR N	RECEIVED BY: (SIGNATURE)		FOR		DATE	TIME	SEAL INTACT Y OR N
DELIVERY METHOD				COMMENTS									
ANALYTICAL LABORATORY													

**Remedial Investigation Work Plan
1022 Old Country Road, Plainview, New York 11803**

APPENDIX B

Quality Assurance Project Plan

September 15, 2015

QUALITY ASSURANCE PROJECT PLAN

**1022 Old Country Road
Plainview, New York 11803**

Prepared for

**MORTON VILLAGE REALTY COMPANY, INC.
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1.0 INTRODUCTION

This Quality Assurance Project Plan (QAPP) has been prepared to describe the measures that will be taken to ensure that the data generated during performance of the Remedial Investigation (RI) at 1022 Old Country Road, Plainview, New York (Site) are of quality sufficient to meet project-specific data quality objectives (DQOs). The QAPP was prepared in accordance with the guidance provided in New York State Department of Environmental Conservation (NYSDEC) Technical Guidance DER-10 (Technical Guidance for Site Investigation and Remediation) and the United States Environmental Protection Agency's (USEPA's) Guidance for the Data Quality Objectives Process (EPA QA/G-4).

2.0 BACKGROUND, OBJECTIVES, AND SCOPE

In order to achieve project objectives, Roux Associates has developed a scope of work that includes sampling of soil and groundwater. A brief overview of each element of the RI scope of work is provided below. RI sampling locations are shown in Figure 3 of the RI Work Plan.

2.1 Soil

Samples of soil will be collected and analyzed at a minimum of seven locations for the following:

- Target Compound List (TCL) volatile organic compounds (VOCs)

2.2 Groundwater

Groundwater samples will be collected from three new monitoring wells installed by Roux Associates during the RI. After gauging for water level measurements, each well will be sampled and analyzed for the following:

- TCL VOCs

Field parameters, including temperature, pH, conductivity, redox potential, dissolved oxygen, and turbidity will also be measured.

2.3 Soil Vapor

Soil vapor samples, include sub-slab and indoor air samples will be collected and analyzed during Phase B of this RI. Each soil vapor, sub-slab and indoor air sample will be collected and analyzed for the following:

- VOCs (TO15)

3.0 PROJECT ORGANIZATION

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

Project Manager

Joseph Duminuco of Roux Associates will serve as Project Manager. The Project Manager is responsible for defining project objectives and bears ultimate responsibility for the successful completion of the investigation. This individual will provide overall management for the implementation of the scope of work and will coordinate all field activities. The Project Manager is also responsible for data review/interpretation and report preparation. Activities of the Project Manager are supported by the Project Quality Assurance Coordinator.

Field Team Leader

Jeff Wills of Roux Associates will serve as the Field Team Leader. The Field Team Leader bears the responsibility for the successful execution of the field program, as scoped in the RI Work Plan and the Field Sampling Plan (FSP). The Field Team Leader will direct the activities of all technical staff in the field as well all subcontractors. The Field Team Leader will also assist in the interpretation of data and in report preparation. The Field Team Leader reports to the Project Manager.

Laboratory Project Manager

Alpha Analytical (Alpha) of Westborough, Massachusetts, has been selected to analyze the field samples for this project and will be responsible for sample container preparation, sample custody in the laboratory, and completion of the required analysis through oversight of the laboratory staff. Alpha is an Environmental Laboratory Approval Program (ELAP) certified lab as described in Section 5. The Laboratory Project Manager will ensure that quality assurance procedures are followed and that an acceptable laboratory report is prepared and submitted. The Laboratory Project Manager reports to the Field Team Leader.

Quality Assurance Officer

Charles McGuckin, P.E. of Roux Associates/Remedial Engineering will serve as the Quality Assurance Officer (QAO) for this project. The QAO is responsible for conducting reviews,

inspections, and audits to ensure that the data collection is conducted in accordance with the FSP and QAPP. The QAO's responsibilities range from ensuring effective field equipment decontamination procedures and proper sample collection to the review of all laboratory analytical data for completeness and usefulness. The QAO reports to the Project Manager and makes independent recommendations to the Field Team Leader.

4.0 SAMPLING PROCEDURES

Detailed discussions of sampling, decontamination, and sample handling procedures are provided in the FSP (Appendix A of the RI Work Plan).

5.0 QUALITY ASSURANCE/QUALITY CONTROL

The primary intended use for the RI data is to characterize Site conditions and determine if remediation needs to be undertaken at the Site. The primary DQO of the soil and groundwater sampling programs, therefore, is that data be accurate and precise, and hence representative of the actual Site conditions. Accuracy refers to the ability of the laboratory to obtain a true value (i.e., compared to a standard) and is assessed through the use of laboratory quality control (QC) samples, including laboratory control samples and matrix spike samples, as well as through the use of surrogates, which are compounds not typically found in the environment that are injected into the samples prior to analysis. Precision refers to the ability to replicate a value, and is assessed through both field and laboratory duplicate samples.

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

Table 1 lists the field and laboratory QC samples that will be analyzed to assess data accuracy and precision, as well as to determine if equipment sensitivity has been compromised. Table 2 shows the reporting limits and minimum detection limits achievable by the laboratory.

All RI “assessment” analyses (i.e., TCL VOCs) will be performed in accordance with the NYSDEC Analytical Services Protocol (ASP), using USEPA SW-846 methods. Alpha has been selected to analyze the field samples collected during the RI and shall maintain a New York State Department of Health (NYSDOH) ELAP Contract Laboratory Protocol (CLP) certification (Certification Number 10602) for each of the “assessment” analyses listed in Section 2.0.

All laboratory data are to be reported in NYSDEC ASP Category B deliverables and will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC’s website (<http://www.dec.ny.gov/chemical/62440.html>). A Data Usability Report will be prepared

by an independent party meeting the requirements in Section 2.2(a)1.ii and Appendix 2B of DER-10 for all data packages generated for this RI.

1. Field and Laboratory QC Summary
2. Laboratory Reporting Limits for Soil and Water

Table 1. Field and Laboratory QC Summary
1022 Old Country Road, Plainview, New York

QC Check Type	Minimum Frequency	Use
<u>Field QC</u>		
Duplicate	1 per matrix per SDG*	Precision
Trip Blank	1 per VOC cooler	Sensitivity
Equipment Rinse Blank	1 per day	Sensitivity
<u>Laboratory QC</u>		
Laboratory Control Sample	1 per matrix per SDG	Accuracy
Matrix Spike/Matrix Spike Duplicate/Matrix Duplicate**	1 per matrix per SDG	Accuracy/Precision
Surrogate Spike	All organics samples	Accuracy
Laboratory Duplicate	1 per matrix per SDG	Precision
Method Blank	1 per matrix per SDG	Sensitivity

Notes:

* SDG - Sample Delivery Group - up to 20 samples. Assumes a single extraction or preparation

** Provided to lab by field sampling personnel

**Table 2. Volatile Organic Compound Laboratory Reporting Limits for Soil, Groundwater and Soil Vapor Samples
1022 Old Country Road, Plainview, New York**

Analysis Group Description	Method Description	Method Code			
Soil Analysis	Volatile Organic Compounds (GC/MS)	8260C			
	Analyte	CAS #	RL	MDL	Units
	Methylene chloride	75-09-2	10	1.104	ug/kg
	1,1-Dichloroethane	75-34-3	1.5	0.0856	ug/kg
	Chloroform	67-66-3	1.5	0.37	ug/kg
	Carbon tetrachloride	56-23-5	1	0.21	ug/kg
	1,2-Dichloropropane	78-87-5	3.5	0.228	ug/kg
	Dibromochloromethane	124-48-1	1	0.1536	ug/kg
	1,1,2-Trichloroethane	79-00-5	1.5	0.304	ug/kg
	Tetrachloroethene	127-18-4	1	0.1402	ug/kg
	Chlorobenzene	108-90-7	1	0.348	ug/kg
	Trichlorofluoromethane	75-69-4	5	0.388	ug/kg
	1,2-Dichloroethane	107-06-2	1	0.1134	ug/kg
	1,1,1-Trichloroethane	71-55-6	1	0.1108	ug/kg
	Bromodichloromethane	75-27-4	1	0.1732	ug/kg
	trans-1,3-Dichloropropene	10061-02-6	1	0.1208	ug/kg
	cis-1,3-Dichloropropene	10061-01-5	1	0.1176	ug/kg
	1,1-Dichloropropene	563-58-6	5	0.1414	ug/kg
	Bromoform	75-25-2	4	0.236	ug/kg
	1,1,2,2-Tetrachloroethane	79-34-5	1	0.1008	ug/kg
	Benzene	71-43-2	1	0.118	ug/kg
	Toluene	108-88-3	1.5	0.1948	ug/kg
	Ethylbenzene	100-41-4	1	0.1274	ug/kg
	Chloromethane	74-87-3	5	0.294	ug/kg
	Bromomethane	74-83-9	2	0.338	ug/kg
	Vinyl chloride	75-01-4	2	0.1174	ug/kg
	Chloroethane	75-00-3	2	0.316	ug/kg
	1,1-Dichloroethene	75-35-4	1	0.262	ug/kg
	trans-1,2-Dichloroethene	156-60-5	1.5	0.212	ug/kg
	Trichloroethene	79-01-6	1	0.125	ug/kg
	1,2-Dichlorobenzene	95-50-1	5	0.1532	ug/kg
	1,3-Dichlorobenzene	541-73-1	5	0.135	ug/kg
	1,4-Dichlorobenzene	106-46-7	5	0.1384	ug/kg
	Methyl tert butyl ether	1634-04-4	2	0.0844	ug/kg
	p/m-Xylene	179601-23-1	2	0.1978	ug/kg
	o-Xylene	95-47-6	2	0.1718	ug/kg
	Xylene (Total)	1330-20-7	2	0.1718	ug/kg
	Xylene (Total)	1330-20-7	2	0.1718	ug/kg
	cis-1,2-Dichloroethene	156-59-2	1	0.1428	ug/kg
	Dibromomethane	74-95-3	10	0.1636	ug/kg
	Styrene	100-42-5	2	0.402	ug/kg
	Dichlorodifluoromethane	75-71-8	10	0.1908	ug/kg

**Table 2. Volatile Organic Compound Laboratory Reporting Limits for Soil, Groundwater and Soil Vapor Samples
1022 Old Country Road, Plainview, New York**

Analysis Group Description	Method Description	Method Code			
Soil Analysis	Volatile Organic Compounds (GC/MS)	8260C			
	Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units
	Acetone	67-64-1	10	1.036	ug/kg
	Carbon disulfide	75-15-0	10	1.102	ug/kg
	Bromoform	75-25-2	5	0.61	ug/kg
	Isopropylbenzene	98-82-8	5	0.19	ug/kg
	1,1,2,2-Tetrachloroethane	79-34-5	5	0.52	ug/kg
	1,3-Dichlorobenzene	541-73-1	5	0.21	ug/kg
	1,4-Dichlorobenzene	106-46-7	5	0.67	ug/kg
	1,2-Dichlorobenzene	95-50-1	5	0.24	ug/kg
	1,2-Dibromo-3-Chloropropane	96-12-8	10	4.53	ug/kg
	1,2,4-Trichlorobenzene	120-82-1	5	0.75	ug/kg
	Dibromofluoromethane	1868-53-7	5		ug/kg
	2-Butanone	78-93-3	10	0.272	ug/kg
	Vinyl acetate	108-05-4	10	0.1322	ug/kg
	4-Methyl-2-pentanone	108-10-1	10	0.244	ug/kg
	1,2,3-Trichloropropane	96-18-4	10	0.1626	ug/kg
	2-Hexanone	591-78-6	10	0.666	ug/kg
	Bromochloromethane	74-97-5	5	0.276	ug/kg
	2,2-Dichloropropane	594-20-7	5	0.226	ug/kg
	1,2-Dibromoethane	106-93-4	4	0.1744	ug/kg
	1,3-Dichloropropane	142-28-9	5	0.1452	ug/kg
	1,1,1,2-Tetrachloroethane	630-20-6	1	0.318	ug/kg
	Bromobenzene	108-86-1	5	0.208	ug/kg
	n-Butylbenzene	104-51-8	1	0.1148	ug/kg
	sec-Butylbenzene	135-98-8	1	0.122	ug/kg
	tert-Butylbenzene	98-06-6	5	0.1354	ug/kg
	o-Chlorotoluene	95-49-8	5	0.1598	ug/kg
	p-Chlorotoluene	106-43-4	5	0.1328	ug/kg
	1,2-Dibromo-3-chloropropane	96-12-8	5	0.396	ug/kg
	Hexachlorobutadiene	87-68-3	5	0.228	ug/kg
	Isopropylbenzene	98-82-8	1	0.1038	ug/kg
	p-Isopropyltoluene	99-87-6	1	0.125	ug/kg
	Naphthalene	91-20-3	5	0.1384	ug/kg
	Acrylonitrile	107-13-1	10	0.514	ug/kg
	n-Propylbenzene	103-65-1	1	0.1092	ug/kg
	1,2,3-Trichlorobenzene	87-61-6	5	0.1476	ug/kg
	1,2,4-Trichlorobenzene	120-82-1	5	0.1818	ug/kg
	1,3,5-Trimethylbenzene	108-67-8	5	0.1434	ug/kg
	1,2,4-Trimethylbenzene	95-63-6	5	0.1414	ug/kg
	1,4-Dioxane	123-91-1	100	14.42	ug/kg
	1,4-Diethylbenzene	105-05-5	4	0.1598	ug/kg
	4-Ethyltoluene	622-96-8	4	0.124	ug/kg
	1,2,4,5-Tetramethylbenzene	95-93-2	4	0.1302	ug/kg
	Ethyl ether	60-29-7	5	0.26	ug/kg
	trans-1,4-Dichloro-2-butene	110-57-6	5	0.392	ug/kg

**Table 2. Volatile Organic Compound Laboratory Reporting Limits for Soil, Groundwater and Soil Vapor Samples
1022 Old Country Road, Plainview, New York**

Analysis Group Description	Method Description	Method Code			
Water Analysis	Volatile Organic Compounds (GC/MS)	8260C			
	Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units
	Methylene chloride	75-09-2	2.5	0.7	ug/l
	1,1-Dichloroethane	75-34-3	2.5	0.7	ug/l
	Chloroform	67-66-3	2.5	0.7	ug/l
	Carbon tetrachloride	56-23-5	0.5	0.134	ug/l
	1,2-Dichloropropane	78-87-5	1	0.133	ug/l
	Dibromochloromethane	124-48-1	0.5	0.149	ug/l
	1,1,2-Trichloroethane	79-00-5	1.5	0.5	ug/l
	Tetrachloroethene	127-18-4	0.5	0.181	ug/l
	Chlorobenzene	108-90-7	2.5	0.7	ug/l
	Trichlorofluoromethane	75-69-4	2.5	0.7	ug/l
	1,2-Dichloroethane	107-06-2	0.5	0.132	ug/l
	1,1,1-Trichloroethane	71-55-6	2.5	0.7	ug/l
	Bromodichloromethane	75-27-4	0.5	0.192	ug/l
	trans-1,3-Dichloropropene	10061-02-6	0.5	0.164	ug/l
	cis-1,3-Dichloropropene	10061-01-5	0.5	0.144	ug/l
	1,1-Dichloropropene	563-58-6	2.5	0.7	ug/l
	Bromoform	75-25-2	2	0.65	ug/l
	1,1,2,2-Tetrachloroethane	79-34-5	0.5	0.144	ug/l
	Benzene	71-43-2	0.5	0.159	ug/l
	Toluene	108-88-3	2.5	0.7	ug/l
	Ethylbenzene	100-41-4	2.5	0.7	ug/l
	Chloromethane	74-87-3	2.5	0.7	ug/l
	Bromomethane	74-83-9	2.5	0.7	ug/l
	Vinyl chloride	75-01-4	1	0.33	ug/l
	Chloroethane	75-00-3	2.5	0.7	ug/l
	1,1-Dichloroethene	75-35-4	0.5	0.142	ug/l
	trans-1,2-Dichloroethene	156-60-5	2.5	0.7	ug/l
	Trichloroethene	79-01-6	0.5	0.175	ug/l
	1,2-Dichlorobenzene	95-50-1	2.5	0.7	ug/l
	1,3-Dichlorobenzene	541-73-1	2.5	0.7	ug/l
	1,4-Dichlorobenzene	106-46-7	2.5	0.7	ug/l
	Methyl tert butyl ether	1634-04-4	2.5	0.7	ug/l
	p/m-Xylene	179601-23-1	2.5	0.7	ug/l
	o-Xylene	95-47-6	2.5	0.7	ug/l
	Xylene (Total)	1330-20-7	2.5	0.7	ug/l
	Xylene (Total)	1330-20-7	2.5	0.7	ug/l
	cis-1,2-Dichloroethene	156-59-2	2.5	0.7	ug/l
	Dibromomethane	74-95-3	5	1	ug/l
	1,2,3-Trichloropropane	96-18-4	2.5	0.7	ug/l

**Table 2. Volatile Organic Compound Laboratory Reporting Limits for Soil, Groundwater and Soil Vapor Samples
1022 Old Country Road, Plainview, New York**

Analysis Group Description	Method Description	Method Code			
Water Analysis	Volatile Organic Compounds (GC/MS)	8260C			
	Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units
	Acrylonitrile	107-13-1	5	1.5	ug/l
	Styrene	100-42-5	2.5	0.7	ug/l
	Dichlorodifluoromethane	75-71-8	5	1	ug/l
	Acetone	67-64-1	5	1.46	ug/l
	Carbon disulfide	75-15-0	5	1	ug/l
	2-Butanone	78-93-3	5	1.94	ug/l
	Vinyl acetate	108-05-4	5	1	ug/l
	4-Methyl-2-pentanone	108-10-1	5	1	ug/l
	2-Hexanone	591-78-6	5	1	ug/l
	Bromochloromethane	74-97-5	2.5	0.7	ug/l
	2,2-Dichloropropane	594-20-7	2.5	0.7	ug/l
	1,2-Dibromoethane	106-93-4	2	0.65	ug/l
	1,3-Dichloropropane	142-28-9	2.5	0.7	ug/l
	1,1,1,2-Tetrachloroethane	630-20-6	2.5	0.7	ug/l
	Bromobenzene	108-86-1	2.5	0.7	ug/l
	n-Butylbenzene	104-51-8	2.5	0.7	ug/l
	sec-Butylbenzene	135-98-8	2.5	0.7	ug/l
	tert-Butylbenzene	98-06-6	2.5	0.7	ug/l
	o-Chlorotoluene	95-49-8	2.5	0.7	ug/l
	p-Chlorotoluene	106-43-4	2.5	0.7	ug/l
	1,2-Dibromo-3-chloropropane	96-12-8	2.5	0.7	ug/l
	Hexachlorobutadiene	87-68-3	2.5	0.7	ug/l
	Isopropylbenzene	98-82-8	2.5	0.7	ug/l
	p-Isopropyltoluene	99-87-6	2.5	0.7	ug/l
	Naphthalene	91-20-3	2.5	0.7	ug/l
	n-Propylbenzene	103-65-1	2.5	0.7	ug/l
	1,2,3-Trichlorobenzene	87-61-6	2.5	0.7	ug/l
	1,2,4-Trichlorobenzene	120-82-1	2.5	0.7	ug/l
	1,3,5-Trimethylbenzene	108-67-8	2.5	0.7	ug/l
	1,2,4-Trimethylbenzene	95-63-6	2.5	0.7	ug/l
1,4-Dioxane	123-91-1	250	41.1	ug/l	
1,4-Diethylbenzene	105-05-5	2	0.7	ug/l	
4-Ethyltoluene	622-96-8	2	0.7	ug/l	
1,2,4,5-Tetramethylbenzene	95-93-2	2	0.65	ug/l	
Ethyl ether	60-29-7	2.5	0.7	ug/l	
trans-1,4-Dichloro-2-butene	110-57-6	2.5	0.7	ug/l	

**Table 2. Volatile Organic Compound Laboratory Reporting Limits for Soil, Groundwater and Soil Vapor Samples
1022 Old Country Road, Plainview, New York**

Analysis Group Description	Method Description	Method Code			
Soil Vapor Analysis	Volatile Organic Compounds (GC/MS)	TO-15			
	Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units
	Acetone	67-64-1	0.64	0.33	ug/m3
	1,3-Butadiene	106-99-0	0.60	0.10	ug/m3
	Benzene	71-43-2	0.86	0.11	ug/m3
	Bromodichloromethane	75-27-4	1.8	0.26	ug/m3
	Bromoform	75-25-2	2.8	0.49	ug/m3
	Bromomethane	74-83-9	1.0	0.17	ug/m3
	Bromoethene	593-60-2	1.2	0.20	ug/m3
	Benzyl Chloride	100-44-7	1.4	0.32	ug/m3
	Carbon disulfide	75-15-0	0.84	0.13	ug/m3
	Chlorobenzene	108-90-7	1.2	0.21	ug/m3
	Chloroethane	75-00-3	0.71	0.15	ug/m3
	Chloroform	67-66-3	1.3	0.16	ug/m3
	Chloromethane	74-87-3	0.56	0.21	ug/m3
	3-Chloropropene	107-05-1	0.85	0.16	ug/m3
	2-Chlorotoluene	95-49-8	1.4	0.22	ug/m3
	Carbon tetrachloride	56-23-5	1.7	0.21	ug/m3
	Cyclohexane	110-82-7	0.93	0.12	ug/m3
	1,1-Dichloroethane	75-34-3	1.1	0.15	ug/m3
	1,1-Dichloroethylene	75-35-4	1.1	0.27	ug/m3
	1,2-Dibromoethane	106-93-4	2.1	0.28	ug/m3
	1,2-Dichloroethane	107-06-2	1.1	0.12	ug/m3
	1,2-Dichloropropane	78-87-5	1.2	0.18	ug/m3
	1,4-Dioxane	123-91-1	0.97	0.58	ug/m3
	Dichlorodifluoromethane	75-71-8	1.3	0.20	ug/m3
	Dibromochloromethane	124-48-1	2.3	0.43	ug/m3
	trans-1,2-Dichloroethylene	156-60-5	1.1	0.37	ug/m3
	cis-1,2-Dichloroethylene	156-59-2	1.1	0.12	ug/m3
	cis-1,3-Dichloropropene	10061-01-5	1.2	0.15	ug/m3
	m-Dichlorobenzene	541-73-1	1.6	0.26	ug/m3
	o-Dichlorobenzene	95-50-1	1.6	0.23	ug/m3
	p-Dichlorobenzene	106-46-7	1.6	0.29	ug/m3
	trans-1,3-Dichloropropene	10061-02-6	1.2	0.15	ug/m3
	Ethanol	64-17-5	1.3	0.41	ug/m3
	Ethylbenzene	100-41-4	1.2	0.20	ug/m3
	Ethyl Acetate	141-78-6	0.97	0.29	ug/m3
	4-Ethyltoluene	622-96-8	1.3	0.21	ug/m3
	Freon 113	76-13-1	2.1	0.41	ug/m3

**Table 2. Volatile Organic Compound Laboratory Reporting Limits for Soil, Groundwater and Soil Vapor Samples
1022 Old Country Road, Plainview, New York**

Analysis Group Description	Method Description	Method Code			
Soil Vapor Analysis	Volatile Organic Compounds (GC/MS)	TO-15			
	Analyte Description	CAS Number	RL - Limit	MDL - Limit	Units
	Freon 114	76-14-2	1.9	0.29	ug/m3
	Heptane	142-82-5	1.1	0.12	ug/m3
	Hexachlorobutadiene	87-68-3	2.9	0.73	ug/m3
	Hexane	110-54-3	0.95	0.20	ug/m3
	2-Hexanone	591-78-6	1.1	0.35	ug/m3
	Isopropyl Alcohol	67-63-0	0.66	0.22	ug/m3
	Methylene chloride	75-09-2	0.94	0.63	ug/m3
	Methyl ethyl ketone	78-93-3	0.80	0.16	ug/m3
	Methyl Isobutyl Ketone	108-10-1	1.1	0.23	ug/m3
	Methyl Tert Butyl Ether	1634-04-4	0.97	0.19	ug/m3
	Methylmethacrylate	80-62-6	1.1	0.19	ug/m3
	Naphthalene	91-20-3	1.4	0.41	ug/m3
	Propylene	115-07-1	1.2	0.11	ug/m3
	Styrene	100-42-5	1.1	0.19	ug/m3
	1,1,1-Trichloroethane	71-55-6	1.5	0.18	ug/m3
	1,1,2,2-Tetrachloroethane	79-34-5	1.9	0.36	ug/m3
	1,1,2-Trichloroethane	79-00-5	1.5	0.26	ug/m3
	1,2,4-Trichlorobenzene	120-82-1	2.0	0.60	ug/m3
	1,2,4-Trimethylbenzene	95-63-6	1.3	0.19	ug/m3
	1,3,5-Trimethylbenzene	108-67-8	1.3	0.19	ug/m3
	2,2,4-Trimethylpentane	540-84-1	1.3	0.16	ug/m3
	Tertiary Butyl Alcohol	75-65-0	0.82	0.18	ug/m3
	Tetrachloroethylene	127-18-4	0.36	0.34	ug/m3
	Tetrahydrofuran	109-99-9	0.80	0.19	ug/m3
	Toluene	108-88-3	1.0	0.15	ug/m3
	Trichloroethylene	79-01-6	0.28	0.21	ug/m3
	Trichlorofluoromethane	75-69-4	1.5	0.21	ug/m3
	Vinyl chloride	75-01-4	0.69	0.10	ug/m3
	Vinyl Acetate	108-05-4	0.95	0.46	ug/m3
	m,p-Xylene	-	1.2	0.40	ug/m3
	o-Xylene	95-47-6	1.2	0.20	ug/m3
	Xylenes (total)	1330-20-7	1.2	0.20	ug/m3

**Remedial Investigation Work Plan
1022 Old Country Road, Plainview, New York 11803**

APPENDIX C

Site Health and Safety Plan

September 15, 2015

HEALTH AND SAFETY PLAN

**1022 Old Country Road
Plainview, New York 11803**

Prepared for

**MORTON VILLAGE REALTY COMPANY, INC.
% John Curran
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ROUX ASSOCIATES, INC.

Environmental Consulting & Management



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- K. OSHA Log of Occupational Injuries and Illnesses

APPROVALS

By their signature, the undersigned certify that this Health and Safety Plan (HASP) is approved and will be utilized at the project site located at 1022 Old Country Road, Plainview, New York.

Ray Fitzpatrick
Office Health and Safety Manager
Roux Associates, Inc.

Date

Joseph Duminuco
Project Principal
Roux Associates, Inc.

Date

Jeff Wills
Project Manager/SHSO
Roux Associates, Inc.

Date

1.0 INTRODUCTION

This Site-specific Health and Safety Plan (HASP) has been prepared in accordance with 29 CFR 1910.120 Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response (HAZWOPER) and Roux Associates, Inc. (Roux Associates) Standard Operating Procedures (SOPs) and other OSHA requirements for job safety and health protection (Appendix A). It addresses all activities described below that are associated with the property located at 1022 Old Country Road, in the Hamlet of Plainview, New York (Site). The location of the Site is presented in Figure 1. The HASP will be implemented by the designated Site Health and Safety Officer (SSO) during work at the Site. The HASP attempts to identify all potential hazards at the Site; however, Site conditions are dynamic and new hazards may appear constantly. Personnel must remain alert to existing and potential hazards as Site conditions change and protect themselves accordingly.

Compliance with this HASP is required of all persons and subcontractors who perform fieldwork at the Site. The contents of this HASP may change or undergo revision based upon additional information made available to health and safety personnel, monitoring results, or changes in the technical scope of work. Any changes proposed must be reviewed and approved by the Office Health and Safety Manager (OHSM), with the SSO implementing the changes to the HASP.

Prior to performing work each task should be evaluated to determine the appropriate procedures that need to be followed.

1.1 Scope of Work

In general, the tasks will include the following:

- Implementation of Remedial Investigation (RI) activities consisting of monitoring well installation, groundwater sampling, soil borings/sampling, installation of soil vapor and sub-slab monitoring points, and soil vapor sampling (including sub-slab and indoor air sampling).

Any change in scope will require a revision of this HASP to address any new hazards.

2.0 EMERGENCY INFORMATION AND NOTIFICATION

Multiple emergency services may be obtained by calling 911. More specific numbers for local services are listed below.

Emergency Medical Service	911
<u>Police</u> : Nassau County Police Department	911
Fire: Plainview Fire Department.....	911
<u>Hospital</u> : North Shore University Hospital.....	516-719-3000
National Response Center.....	800-424-8802
Poison Control Center.....	800-222-1222
CHEMTREC.....	800-262-8200
Center for Disease Control.....	800-311-3435
USEPA (Region II).....	212-637-5000
NYSDEC Emergency Spill Response	800-457-7362
First Care & Occupational Health Clinic	631-435-0110
(For non-emergency medical services)	

Directions and maps to the Hospital and the Clinic are provided in Figures 2 and 3, respectively.

2.1 Notification

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone: (Direct contact, no phone messages).

		<u>Office:</u>	<u>Cell:</u>
1. Project Principal:	Joseph Duminuco	(631) 232-2600	(631) 921-6279
2. Project Manager/SSO:	Jeff Wills	(631) 232-2600	(516) 637-0213
3. Office Health and Safety Manager:	Ray Fitzpatrick	(631) 232-2600	(631) 484-1168
4. Corporate Health & Safety Manager:	Joseph Gentile	(856) 423-8800	(610) 844-6911
5. Office Manager:	Brian Morrissey	(631) 232-2600	(631) 921-6355

Accident reporting guidelines are outlined in section 13.5 of this HASP.

3.0 HEALTH AND SAFETY PERSONNEL

This section briefly describes all Site personnel and their health and safety responsibilities for the RI work to be implemented at the Site. All personnel are responsible for ensuring compliance with the HASP.

Project Principal (PP) – Joseph Duminuco – Roux Associates

- Has the overall responsibility for the health and safety of Site personnel.
- Ensures that adequate resources are provided to the field health and safety staff to carry out their responsibilities as outlined below.

Office Health and Safety Manager (OHSM) – Ray Fitzpatrick – Roux Associates

- Implements the HASP.
- Performs or oversees site-specific training and approves revised or new safety protocols or field operations.
- Coordinates revisions of this HASP with Project Principal.
- Responsible for the development of new task safety protocols and procedures and resolution of any outstanding safety issues which may arise during the performance of site work.
- Review and approve all health and safety training and medical surveillance records for personnel and subcontractors.

Project Manager/Site Safety and Health Officer (PM/SSO) – Jeff Wills – Roux Associates

- Directs and coordinates health and safety monitoring activities.
- Ensures that field teams utilize proper personal protective equipment.
- Conducts initial onsite specific training prior to personnel and/or subcontractors commencing work.
- Conducts and documents daily pre-job safety briefings.
- Ensures that field team members comply with this HASP.
- Completes and maintains all accident investigation and reporting forms.
- Notifies PP and OHSM of all accidents/incidents.

- Notifies PP of daily field operations and work progress, who will then communicate at the end of the day to the designated representative the following:
 1. End of day tasks completed
 2. Next day's planned activities
 3. Third party issues
 4. Change of Plans – approvals
- Determines upgrade or downgrade of personal protective equipment (PPE) based on Site conditions and/or real time monitoring results.
- Ensures that monitoring instruments are calibrated daily or as manufacturers suggested instructions determine.
- Submits and maintains health and safety field log books, daily safety logs, training logs, air monitoring result reports, weekly safety report.

Field Personnel and Subcontractors

- Report any unsafe or potentially hazardous conditions to the PM/SSO.
- Maintain knowledge of the information, instructions, and emergency response actions contained in the HASP.
- Comply with rules, regulations, and procedures as set forth in this HASP and any revisions, which are instituted.
- Prevent admittance to work Site by unauthorized personnel.

In the case that there is a change in any of the above personnel, all onsite personnel will be notified of the change. The new responsible party shall review and sign that they have been given a documented verbal full HASP review by Roux Associates and are aware of their responsibilities as outlined in this HASP.

4.0 SITE LOCATION, DESCRIPTION, AND HISTORY

Descriptions of the Site and surrounding property usage are included in the following sections.

The location of the Site is presented in Figure 1.

4.1 Property Location and Description

The Site is identified as Block 555, Lots 10, 86/89 and 88 on the Nassau County tax maps. The Site is located on the north side of Old Country Road between the corners of Rex Place and Lester Place. The Site consists of one two-story building and three one-story buildings and paved parking lot encompassing a total of 9.936 acres and is bordered by Knowles Street to the north, Old Country Road to the south, Lester Place to the east and Rex Place to the west. The surface elevation of the property is approximately 145 feet. Topography of the property slopes slightly to the south.

The surrounding properties to the north, east, and west are all residential properties. To the south of the Site, there are both residential properties as well as the Plainview-Old Bethpage Public Library.

The Site was previously used for agricultural use until developed as a shopping center in 1956. The Site has been improved with commercial developments since the late 1950s. Past commercial uses included a dry cleaning facility (former Morton Village Cleaners) from the late 1950s to 2007. Based on previous environmental investigations, the following Areas of Concern (AOCs) were identified at the Site:

- Former Morton Village Cleaners operations that were conducted between late 1950's and 2007.
- One historical Gas Station occupied the property adjacent to the southeast corner of the Site (Section 12, Block 555, Lot 6).
- Significant staining and standing oil observed in an elevator pit for the freight elevator in one of the existing Buildings (Building C) during a September 2008 site visit.

5.0 WASTE DESCRIPTION/CHARACTERIZATION

5.1 General

The following information is presented in order to identify the types of materials that may be encountered at the Site. The detailed information on these materials was obtained from:

- Sax's Dangerous Properties of Industrial Materials – Lewis Eight Edition
- Chemical Hazards of the Workplace – Proctor/Hughes
- Condensed Chemical Dictionary – Hawley
- Rapid Guide to Hazardous Chemical in the Workplace – Lewis 1990
- NIOSH Pocket Guide to Chemical Hazards – 2005
- ACGIH TLV Values and Biological Exposure Indices
- OSHA 29 CFR 1910.1000

5.2 Chemical Data Sheets

Several chemicals that may potentially be present in soils and groundwater at the Site, based on previous soil, soil vapor and groundwater sampling results and historic operations conducted at the Site that have been identified. The Summary of Toxicological Data is found in Table 1 and is provided for review of chemicals that may be encountered. The Summary of Toxicological Data Sheets provides information such as the chemicals characteristics, health hazards, protection, and exposure limits. Material Safety Data Sheets (MSDSs) for products that have been identified at the Site are available for review by project personnel (Appendix B).

5.2.1 Contaminants of Concern

Soil and groundwater contaminants that may be encountered during drilling and sampling activities include both organic and inorganic compounds. Prior investigations at the Site have indicated detection of VOCs, Polycyclic Aromatic Hydrocarbons (PAHs) and metals in soil. Tetrachloroethene and trichloroethene were detected in groundwater and soil vapor samples. The toxicological, physical, and chemical properties of potential contaminants are presented in Table 1, and identified contaminants are presented in Appendix B.

6.0 HAZARD ASSESSMENT

The potential to encounter chemical hazards is dependent upon the work activity performed (intrusive versus non-intrusive) and the duration and location of the work activity. Such hazards could include inhalation and/or skin contact with chemicals/gases that could cause: dermatitis, skin burns, being overcome by vapors or asphyxiation.

Physical hazards that may be encountered during Site work include heat and cold stress, being crushed, head injuries, punctures, cuts, falls, electrocution, bruises and other physical hazards due to motor vehicle operation, equipment use and power tools

Biological hazards may exist during Site activities. These hazards include exposure to insect bites/stings, animals and animal wastes, mold and blood borne pathogens.

Prior to the beginning of each new phase of work, a job safety analysis (JSA) (Appendix C) will be prepared by the PM/SSO with assistance from the OHSM. The analysis will address the hazards for each activity performed in the phase and will present the procedures and safeguards necessary to eliminate the hazards or reduce the risk. JSAs for each task will be reviewed with onsite personnel at each morning tailgate meeting and as tasks change throughout the day.

6.1 Chemical Hazards

The potential for personnel and subcontractors to come in contact with chemical hazards may occur during the following tasks:

- Installation and sampling of soil borings, and
- Installation, gauging, purging and sampling of temporary monitoring wells.

For chronic and acute toxicity data, refer to Summary of Toxicological Data Sheets (Table 1) and MSDSs (Appendix B) for further details on compound characteristics.

6.1.1 Exposure Pathways

Exposure to these compounds during ongoing activities may occur through inhalation of contaminated dust particles, inhalation of VOCs and SVOCs, dermal absorption, and accidental ingestion of the contaminant by either direct or indirect cross-contamination activities.

6.1.2 Operational Action Levels

A decision-making protocol for an upgrade in levels of protection and/or withdrawal of personnel from an area based on exposure levels is outlined in Table 2.

6.1.3 Additional Precautions

Dermal absorption or skin contact with chemical compounds is possible during intrusive activities and while gauging, purging or sampling a monitoring well at the Site. The use of PPE in accordance with Section 8.2 and strict adherence to proper decontamination procedures should significantly reduce the risk of skin contact.

The potential for accidental ingestion of potentially hazardous chemicals is expected to be remote, when good hygiene practices are used.

6.2 Physical Hazards

A variety of physical hazards may be present during Site activities. These hazards are similar to those associated with any investigation-type project and include equipment operation and hazardous walking and working surfaces. The referenced hazards are not unique and are generally familiar to most hazardous waste site workers at environmental sites. Task-specific safety requirements for each phase will be covered during safety briefings.

6.2.1 Heat Stress

Heat stress is a significant potential hazard, associated with the use of protective equipment in a hot weather environment. The human body is designed to function at a certain internal temperature. When metabolism or external sources (fire or hot summer day) cause the body temperature to rise, the body seeks to protect itself by triggering cooling mechanisms. The PM/SSO will monitor the air temperature (as described later in this section) to determine potential adverse effects the weather can cause onsite personnel. Excess heat is dissipated by two means:

- Changes in blood flow to dissipate heat by convection, which can be seen as "flushing" or reddening of the skin in extreme cases.
- Perspiration, the release of water through skin and sweat glands. While working in hot environments, evaporation of perspiration is the primary cooling mechanism.

Protective clothing worn to guard against chemical contact effectively stops the evaporation of perspiration. Thus the use of protective clothing increases heat stress problems.

The major disorders due to heat stress are heat cramps, heat exhaustion, and heat stroke. Heat cramps are painful spasms, which occur in the skeletal muscles of workers who sweat profusely in the heat and drink large quantities of water, but fail to replace the bodies lost salts or electrolytes. Drinking water while continuing to lose salt tends to dilute the body's extracellular fluids. Soon water seeps by osmosis into active muscles and causes pain. Muscles fatigued from work are usually most susceptible to cramps.

Extreme weakness or fatigue, dizziness, nausea, and headache characterize heat exhaustion. In serious cases, a person may vomit or lose consciousness. The skin is clammy and moist, complexion pale or flushed, and body temperature normal or slightly higher than normal. Treatment is rest in a cool place and replacement of body water lost by perspiration. Mild cases may recover spontaneously with this treatment; severe cases may require care for several days. There are no permanent effects. As first aid treatment, the person shall be moved to a cool place. Body heat should be reduced artificially, but not too rapidly, by soaking the person's clothes in water and fanning them.

Heat stroke is considered a medical emergency and is caused by the breakdown of the body's regulating mechanisms. The skin is very dry and hot with red mottled or bluish appearance. Unconsciousness, mental confusion, or convulsions may occur. Without quick and adequate treatment, the result can be death or permanent brain damage.

Steps that can be taken to reduce heat stress are:

- Acclimate the body. Allow a period of adjustment to make further heat exposure endurable.
- Drink more liquids to replace the body water lost during sweating.
- Rest is necessary and should be conducted under the direction of the PM/SSO.
- Wear personal cooling devices. These are two basic designs; units with pockets for holding frozen packets and units that circulate fluid from a reservoir through tubes to different parts of the body. Both designs can be in the form of a vest, jacket, or coverall. Some circulating units also have a cap for cooling the head.

Heat stress is a significant hazard associated with using protective equipment in hot weather environments. Local weather conditions may produce conditions, which will require restricted work schedules in order to protect employees.

Appendix D contains procedures for heat stress; these will be used as a guideline and to provide additional information.

6.2.2 Cold Stress

Cold temperatures are a significant potential hazard. Examples of cold temperature hazards are frostbite and hypothermia.

Frostbite is the most common injury resulting from exposure to cold. The extremities of the body are most often affected. The signs of frostbite are:

- The skin turns white or grayish-yellow.
- Pain is sometimes felt early but subsides later. Often there is no pain.
- The affected parts feel intensely cold and numb.

Hypothermia is characterized by shivering, numbness, drowsiness, muscular weakness, and a low internal body temperature when the body feels extremely warm. This can lead to unconsciousness and death. With both frostbite and hypothermia, the affected areas need to be warmed quickly. Immersion in warm water is an effective means of warming the affected areas quickly. In such cases, medical assistance will be sought.

To prevent these effects from occurring, persons working in the cold shall wear adequate clothing and reduce the time spent in the cold area. The field PM/SSO is responsible for determining appropriate time personnel shall spend in adverse weather conditions and will monitor this.

Appendix D, which contains the Heat and Cold Stress Guidelines, provides additional information.

6.3 Biological Hazards

The biological hazards, which have the potential to cause adverse health effects, are from exposure to domestic flies, mosquitoes, insects, animals and animal wastes, mold and bloodborne pathogens.

6.3.1 Insect Stings

Stings from insects are often painful, cause swelling and can be fatal if a severe allergic reaction such as anaphylactic shock occurs. If a sting occurs, the stinger should be scraped out of the skin, opposite of the sting direction. The area should be washed with soap and water followed by application of an ice pack.

If the victim has a history of allergic reaction, he shall be taken to the nearest medical facility. If the victim has medication to reverse the effects of the sting, it should be taken immediately.

If the victim experiences a severe reaction, a constricting band should be placed between the sting and the heart. The bitten area should be kept below the heart if possible. A physician shall be contacted immediately for further instructions.

6.3.2 Animals and Animal Wastes

Due to the site location within a Suburban area, there lies the potential for various wildlife at the site, including, but not limited to, pigeons, bats, mice, rats, squirrels, raccoons, and feral cats. Certain animals can represent significant sources (vectors) of disease transmission. Precautions to avoid or minimize potential contact with (biting) animals (such as some of the above listed) or animal waste and/or deceased animals should be considered prior to all field activities. Rats, squirrels, raccoons, feral cats, and other wild animals can inflict painful bites which can also cause disease (as in the case of rabid animals). Site personnel should avoid contact with any of the above.

If contact occurs, be sure to clean the area thoroughly with soap and water as soon as possible. If a bite occurs, the area shall be cleaned thoroughly immediately with soap and water and medical attention shall be sought.

6.3.3 Bloodborne Pathogens

The majority of the occupational tasks onsite will not involve a significant risk of exposure to blood, blood components, or body fluids. The highest risk of acquiring any bloodborne pathogen for onsite employees will be following an injury. When administering first aid care, there are potential hazards associated with bloodborne pathogens that cause diseases such as Human Immunodeficiency Virus (HIV), Hepatitis B (HBV), Hepatitis A (HAV), Hepatitis C (HCV), or the Herpes Simplex Virus (HSV). An employee who has not received the appropriate certification should never execute first aid and/or CPR.

In order to minimize any potential pathogen exposure, all employees should use the hand washing facilities on a regular basis. Additionally, the following universal precautions shall be followed to prevent further potential risk:

- Direct skin or mucous membrane contact with blood shall be avoided.
- Open skin cuts or sores shall be covered to prevent contamination from infectious agents.
- Body parts shall be washed immediately after contact with blood or body fluids that might contain blood, even when gloves or other barriers have been used.
- Gloves and disposable materials used to clean spilled blood shall be properly disposed of in an approved hazardous waste container.
- First aid responders shall wear latex or thin mil nitrile gloves when performing any procedure risking contact with blood or body substances.
- Safety glasses with attached side shields will be worn to protect the eyes from splashing or aerosolization of body fluids.
- A CPR mask will be worn when performing CPR to avoid mouth-to-mouth contact.
- Appropriate work gloves will be worn to minimize the risk of injury to the hands and fingers when working on all equipment with sharp or rough edges.
- Never pick up broken glass or possible contaminated material with your unprotected hands.
- Never handle wildlife (living or deceased) encountered onsite.

6.4 Hazard Assessment

Task	Hazards	Risk of Exposure
Installation, gauging, purging and sampling of Groundwater Monitoring Wells	Inhalation/Skin Contact	Moderate/High
	Heat Stress/Cold Stress	Moderate
	Physical Injury	Moderate
Installation and sampling of Soil Borings	Inhalation/Skin Contact	Moderate/High
	Heat Stress/Cold Stress	Moderate
	Physical Injury	Moderate
<u>Installation and sampling of soil vapor and sub-slab points and sampling of indoor air</u>	Inhalation/Skin Contact	Moderate/High
	Heat Stress/Cold Stress	Moderate
	Physical Injury	Moderate

7.0 TRAINING

7.1 General Health and Safety Training

In accordance with Roux Associates' corporate policies, and pursuant to 29 CFR 1910.120, hazardous waste site workers shall, at the time of the job assignment, have received a minimum of 40 hours of initial health and safety training for hazardous waste site operations. As a minimum, the training shall have consisted of instruction in the topics outlined in the above reference. Personnel who have not met the requirements for initial training will not be allowed to work in any Site activities in which they may be exposed to hazards (chemical or physical).

Completion of a 40-hour Health and Safety Training Course for Hazardous Waste Operations or an approved equivalent will fulfill the requirements of this section.

Roux Associates' PM/SSO has the responsibility of ensuring that personnel assigned to this project comply with these requirements.

7.2 Annual Eight-Hour Refresher Training

Current, annual 8-hour refresher training will be required of all hazardous waste site field personnel in order to maintain their qualifications for fieldwork. The following topics will be reviewed; toxicology, respiratory protection, medical surveillance, decontamination procedures, and personal protective clothing. In addition, topics deemed necessary by Roux Associates' Health and Safety Director may be added to the above list.

7.3 Site-Specific Training

Site personnel will receive documented training that will specifically address the activities, procedures, monitoring and equipment for Site operations. It will include Site and facility layout, hazards, first aid equipment locations and emergency services at the Site, and will highlight all provisions contained within this HASP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

7.4 Onsite Safety Meetings

Daily-documented (Appendix E) pre-work safety meetings will be presented each morning to discuss the scope-of-work for that day, potential safety concerns and control measures for those identified safety hazards as per the JSAs (Appendix C) for the upcoming activities.

The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety audits by Roux Associates or other involved parties.

7.5 First Aid and CPR

The PM/SSO will identify those individuals having first aid and CPR training in order to ensure that emergency medical treatment is available during field activities. The training will be consistent with the requirements of the American Red Cross Association and, as applicable, the American Heart Association. Certification and appropriate training documentation will be kept with the Site personnel records.

7.6 Additional Training / Procedures

The OHSM may require additional or specialized training throughout the project. Such training shall be in the safe operation of heavy or power tool equipment or hazard communication training or other topic deemed Site appropriate.

8.0 MEDICAL SURVEILLANCE PROCEDURES

8.1 General

A Medical Surveillance Program has been established as part of this plan and is included in Appendix F. Roux Associates and subcontractor personnel performing field work at the Site are required to have passed a complete medical surveillance examination in accordance with 29 CFR 1910.120(f). A physician's medical release for work will be confirmed by the PM/SSO before an employee can begin Site activities. Such examinations shall include a statement as to the worker's present health status, the ability to work in a hazardous environment (including any required PPE, which may be used during temperature extremes), and the worker's ability to wear respiratory protection.

In the event that personal medical information is needed for emergency treatment, information will be made available to the treating health care professional through Roux Associates' Human Resources Department and the OHSM.

9.0 SITE CONTROL, PERSONAL PROTECTIVE EQUIPMENT, AND COMMUNICATIONS

A modified Site control approach may be utilized since activities will be limited to site inspection and groundwater sampling. If additional work is necessary, the following four-zone approach will be used in order to prevent the spread of contamination from the disturbed areas onsite.

9.1 Site Control

If remedial activities are necessary, a four-zone approach will be employed. The four zones include: the Exclusion Zone (EZ), the Contamination Reduction Zone (CRZ), Contamination Reduction Corridor (CRC) and the Support Zone (SZ). A stepped remedial approach will be managed and the zones modified as the work progresses. Each of the areas will be defined through the use of control barricades and/or construction/hazard fencing. A clearly marked delineation between the SZ and the remaining three zones, the CRZ, CRC and EZ, will be maintained. The preferred method will utilize high visibility orange fencing and hand-driven metal posts, or orange cones. Signage will be posted to further identify and delineate these areas.

9.1.1 Support Zone

The Support Zone (SZ) is an uncontaminated area that will be the field support area for the Site operations. The SZ will contain the temporary project trailers and provides for field team communications and staging for emergency response. Appropriate sanitary facilities and safety equipment will be located in this zone. Potentially contaminated personnel or materials are not allowed in this zone. The only exception will be appropriately packaged/decontaminated and labeled samples. Meteorological conditions will be observed and noted from this zone, as well as those factors pertinent to heat and cold stress.

9.1.2 Contamination Reduction Zone

A Contamination Reduction Zone (CRZ) is established between the exclusion zone and the support zone. The CRZ contains the Contamination Reduction Corridor (CRC) and provides an area for decontamination of personnel and equipment. The CRZ will be used for general Site entry and egress in addition to access for heavy equipment and emergency support services. Personnel are not allowed in the CRZ without:

- A buddy (co-worker);
- Appropriate PPE;

- Medical authorization;
- Training certification; and
- A need to be in the zone.

9.1.3 Exclusion Zone

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

- A buddy (co-worker);
- Required minimum-level PPE;
- Medical authorization;
- Training certification; and
- A need to be in the zone.

9.2 Personal Protective Equipment

The level of protection worn by field personnel will be enforced by the PM/SSO. Levels of protection for general operations are provided below and are defined in this section. Levels of protection may be upgraded at the discretion of the PM/SSO. All decisions on the level of protection will be based upon a conservative interpretation by the PM/SSO of the information provided by air monitoring results, environmental results and other appropriate information. Any changes in the level of protection shall be recorded in the health and safety field logbook.

9.2.1 Personal Protective Equipment Specifications

The initial level of personal protective equipment is Level D. It is not anticipated that either Level B or Level C protection will be necessary.

The Minimum level of PPE for entry onto the Site is Level D PPE. The following equipment shall be used:

- Work uniform (long pants, sleeved shirt)
- Hard hat
- Steel toe work boots
- Safety glasses with attached side shields
- Boot covers (as needed)
- Hearing protection (as needed)
- High visibility clothing (shirt or vest)

Modified Level D PPE consists of the following:

- Regular Tyvek coveralls (Poly-coated Tyvek as required)
- Outer gloves: cut-resistant, leather, cotton (as required)
- Inner gloves: latex or nitrile (doubled) as required
- Chemical resistant boots over work boots (as required)
- Steel toe work boots
- Hard hat Safety glasses with attached side shields
- Hearing protection as needed

High visibility clothing (shirt or vest). Although not anticipated, any tasks requiring Level B personal protective equipment (PPE) will utilize the following equipment:

- Positive pressure, full facepiece, self-contained breathing apparatus (SCBA) or positive pressure, supplied air respirator with escape SCBA (NIOSH approved)
- Disposable coveralls (Tyvek, Poly-coated Tyvek, or Saranex)
- Gloves, inner: latex or nitrile
- Gloves, outer: cut-resistant
- Chemical resistant boots over the work boots
- Steel toe work boots

- Hard hat
- Hearing protection (as needed)
- Boot cover (as needed)

High visibility clothing (shirt or vest). For tasks requiring Level C PPE, the following equipment may be used in any combination:

- Full-face, air purifying, canister-equipped respirators (NIOSH approved) utilizing Organic Vapor/Acid Gas and P-100 filters (half-face if approved by PM/SSO)
- Disposable coveralls (Tyvek) as required
- Gloves, inner: latex or nitrile as required
- Gloves, outer: cut-resistant
- Chemical resistant boots over the work boots as required
- Steel toe work boots
- Hard hat
- Hearing protection (as needed)
- Safety glasses with attached side shields (if half-mask is utilized)
- Boot covers (as needed)
- High visibility clothing (shirt or vest)

9.2.2 Site Specific Levels of Protection

Levels of protection for the proposed scope of work may be upgraded or downgraded depending on direct-reading instruments or personnel monitoring. The following are the initial levels of protection that shall be used for each planned field activity:

Activity	Initial Level of PPE
Installation, Gauging, Purging and Sampling of Temporary Monitoring Wells	D
Installation and sampling of Soil Borings	D

9.3 Communications

If working in level C/B respiratory protection is required, personnel may find that communication becomes a more difficult task and process to accomplish. Distance and space further complicate this. In order to address this problem, electronic instruments, mechanical devices, or hand signals will be used as follows:

Telephones – Mobile telephones will be carried by designated personnel for communication with emergency support services/facilities.

Radios – Two-way radios will be utilized onsite for communications between field personnel in areas where visual contact cannot be maintained and where hand signals cannot be employed.

Hand Signals – This communication method will be employed by members of the field team along with use of the buddy system. Signals become especially important when in the vicinity of heavy moving equipment and when using Level B respiratory equipment. The signals shall become familiar to the entire field team before Site operations commence, and will be reinforced and reviewed during site-specific training.

Signal

Meaning

Hand gripping throat

Out of air; can't breathe

Grip partner's wrist

Leave area immediately; no debate

Hands on top of head

Need assistance

Thumbs up

OK; I'm all right; I understand

Thumbs down

No; unable to understand you, I'm not all right

10.0 MONITORING PROCEDURES

10.1 General

Monitoring will be performed as necessary to verify the adequacy of respiratory protection, to aid in Site layout, and to document worker exposure. If real-time breathing zone air monitoring in these areas indicates the presence of potentially hazardous materials in exceedances of the Action Levels for Worker Breathing Zone (Table 2), the OHSM will be contacted and a plan for implementing appropriate control measures will be developed. A documented safety briefing to communicate the new procedures to onsite personnel will be conducted. All monitoring instruments shall be operated by qualified personnel only and will be calibrated daily prior to use or, more often, as necessary. Additional monitoring may be required if exclusion zones are employed for specific site activities. General air monitoring will be performed in accordance with the Generic Community Air Monitoring Plan included in Appendix G during intrusive Site activities.

10.2 Instrumentation

The following monitoring instruments will be available for use during field operations as necessary. There will be a minimum of one of each piece of equipment on the Site at all times during intrusive activities:

- Photoionization Detector (PID) with 10.6 EV probe or Flame Ionization Detector (FID) or equivalent.
- Dust/Particulate Monitor (DM), MIE Miniram, or equivalent.

A PID will be used to monitor VOCs in active work areas during intrusive activities. VOCs shall also be measured upwind of the work areas to determine background concentrations.

A particulate monitor shall be used to measure concentrations of dust and particulate matter.

When deemed necessary, a CGI/O₂/CO (or equivalent) meter shall be used to monitor for combustible gases, oxygen content and/ or carbon monoxide during confined space entry or when operating in areas with poor ventilation as the HSO deems necessary.

Calibration records shall be documented and recorded daily and included in the daily air monitoring report. This report will be specific to work area monitoring. All instruments shall be calibrated before and after each daily use in accordance with manufacturer's procedures.

10.3 Action Levels

Action levels for the upgrading of PPE requirements in the HASP will apply to all Site work during investigation and remediation activities at the Site. Action levels are for known contaminants using direct reading instruments in the Breathing Zone (BZ) for VOCs and particulates, and at the source for combustible gases. The BZ will be determined by the PM/SSO, but is typically 4 to 5 feet above the work area surface or elevation. The action levels to be utilized for the Site are found in Table 2.

11.0 SAFETY CONSIDERATIONS

11.1 General

In addition to the specific requirements of this HASP, common sense should be used at all times.

The following general safety rules and practices will be in effect at the site.

- Ignition sources within 35 feet of potentially flammable or contaminated material are strictly prohibited.
- Movement of vehicles and equipment, and other activities will be planned and performed with consideration for the location, height, and relative position of aboveground utilities and fixtures, including signs; lights; canopies; buildings and other structures and construction; and natural features such as trees, boulders, bodies of water, and terrain.
- Approved and appropriate safety equipment (as specified in this HASP), such as eye protection, hard hats, hand protection (nitrile, leather and/or cut resistant gloves as necessary), foot protection, and respirators, must be worn in areas where required.
- No eating, chewing tobacco, gum chewing or drinking will be allowed outside the SZ.
- Contaminated tools and hands must be kept away from the face.
- Personnel must use personal hygiene safe guards (washing up via hand towelettes or potable water) at the end of the shift.
- Each sample must be treated and handled as though it were contaminated.
- Persons with long hair and/or loose-fitting clothing that could become entangled in equipment (e.g., pumps, etc.) must take adequate precautions.
- Horseplay is prohibited in the work area.
- Work while under the influence of intoxicants, narcotics, or controlled substances is strictly prohibited.

11.2 Sample Handling

Personnel responsible for handling of samples will wear the prescribed modified Level D protection. Samples are to be identified as to their hazard and packaged as to prevent spillage or breakage. Any unusual sample conditions shall be noted. Laboratory personnel and all field personnel shall be advised of sample hazard levels and the potential contaminants present. This can be accomplished by a phone call to the lab coordinator and/or including a written statement with the samples reviewing lab safety procedures in handling in order to assure that the practices are appropriate for the suspected contaminants in the sample.

12.0 DECONTAMINATION AND DISPOSAL PROCEDURES

12.1 Contamination Prevention

Contamination prevention should minimize worker exposure and help ensure valid sample results by precluding cross-contamination. Procedures for contamination avoidance include:

Personnel

- Do not walk through areas of obvious or known contamination.
- Do not directly handle or touch contaminated materials.
- Make sure that there are no cuts or tears on PPE.
- Fasten all closures in suits; cover with tape, if necessary.
- Particular care should be taken to protect any skin injuries.
- Stay upwind of airborne contaminants.
- Do not carry cigarettes, cosmetics, gum, etc., into contaminated areas.

Sampling/Monitoring

- When required by the PM/SSO, cover instruments with clear plastic, leaving openings for sampling ports and air exhaust.

12.2 Personnel Decontamination

If an exclusion zone (EZ) is employed at the Site, a field wash for equipment and PPE shall be set up and maintained for all persons exiting the EZ. The system will include a gross wash and rinse for all disposable clothing and boots worn in the EZ. As necessary, equipment and facilities will be available for personnel to wash their hands, arms, neck, and face.

12.3 Equipment Decontamination

All potentially contaminated equipment used at the Site will be decontaminated to prevent contaminants from leaving the Site. The decontamination area will provide for the containment of all wastewater from the decontamination process. Respirators and any other PPE that comes in contact with contaminated materials shall pass through a field wash in the decontamination area, and a thorough decontamination at the end of the day. All decontamination rinse water will be collected and managed in accordance with all applicable regulations.

12.4 Decontamination during Medical Emergencies

If emergency life-saving first aid and/or medical treatment are required, normal decontamination procedures may need to be abbreviated or omitted. The Site PM/SSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination, when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment, or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed, a plastic barrier between the individual and clean surfaces should be used to help prevent contaminating the inside of ambulances and/or medical personnel. Outer garments are then removed at the medical facility. Attempt to wash or rinse the victim if it is known that the individual has been contaminated with an extremely toxic or corrosive material, which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems (ambulatory) or injuries, the normal decontamination procedures will be followed. Note that heat stroke requires prompt treatment to prevent irreversible damage or death. Protective clothing must be promptly removed. Less serious forms of heat stress also require prompt attention and removal of protective clothing immediately. Unless the victim is obviously contaminated, decontamination should be omitted or minimized, and treatment begun immediately.

12.5 Disposal Procedures

A system of segregating all waste will be developed by the PM/SSO.

All discarded materials, waste materials, or other objects shall be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard, or causing litter to be left onsite. All potentially contaminated materials (e.g., clothing, gloves, etc.,) will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials shall be collected, bagged and labeled for appropriate disposal as domestic waste. All waste materials will be staged at the site.

13.0 EMERGENCY PLAN

Should an emergency situation occur, the emergency plan, outlined in this section, shall be known by all onsite personnel prior to the start of work. The emergency plan will be available for use at all times during Site work. The plan provides the phone numbers for the fire, police, ambulance, hospital, poison control centers, and directions to the hospital from the Site. This information is to be found in Section 2 of this HASP.

Various individual Site characteristics will determine preliminary actions taken to assure that this emergency plan is successfully implemented in the event of a Site emergency. Careful consideration must be given to the proximity of neighborhood housing or places of employment, and to the relative possibility of Site release of vapors, which could affect the surrounding community.

The emergency coordinator shall implement the contingency plan whenever conditions at the Site warrant such action. The coordinator will be responsible for coordination of the evacuation, emergency treatment, and transport of Site personnel as necessary, and notification of emergency response units and the appropriate management staff.

In cases where the project principal or project manager is not available, the PM/SSO shall serve as the alternate emergency coordinator.

The PM/SSO during an emergency will perform air monitoring as needed, as well as lend assistance and provide health and safety information to responding emergency personnel.

Site Personnel will endeavor to keep non-essential personnel away from the incident until the appropriate emergency resources arrive. At that time the responders will take control of the Site. Site personnel may be asked to lend assistance to emergency personnel such as during evacuations, help with the injured, etc.

13.1 Evacuation

Evacuation procedures will be discussed prior to the start of work and periodically during safety meetings. In the event of an emergency situation, such as fire, or explosion, an air horn,

automobile horn, or other appropriate device will be sounded for three (3) sharp blasts indicating the initiation of evacuation procedures. The emergency evacuation route shall be known by all site workers. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The PM/SSO or project manager must ensure that access for emergency equipment is provided and that all combustion apparatuses have been shut down once the alarm has been sounded. All Site personnel will assemble in the designated nearest safe location. Once the safety of all personnel is established, the fire department and other emergency response groups will be notified by telephone of the emergency.

13.2 Personnel Injury

Emergency first aid shall be applied onsite as appropriate. For non-emergency situations, treatment should be sought, if needed, through the approved occupational health clinic. If necessary, the individual shall be decontaminated, if needed, and transported to the nearest hospital. The PM/SSO will contact the Human Resources Director and OHSM if medical information is needed.

The ambulance/rescue squad shall be contacted for transport as necessary in an emergency. However, since some situations may require transport of an injured party by other means, the injured person shall be escorted to the occupational health clinic or hospital. Maps to these facilities are shown in Figure 2.

13.3 Accident/Incident Reporting

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone: (Direct contact, no phone messages).

		<u>Office:</u>	<u>Cell:</u>
1. <u>Corporate Health & Safety Manager:</u>	Joseph Gentile	(856) 423-8800	(610) 844-6911
2. <u>Project Principal:</u>	Joseph Duminuco	(631) 232-2600	(631) 921-6279
3. <u>Project Manager/SHSO:</u>	Jeff Wills	(631) 232-2600	(516) 637-0213
4. <u>Office Health and Safety Manager:</u>	Ray Fitzpatrick	(631)-232-2600	(631) 484-1168

Written confirmations of verbal reports are to be submitted within 24 hours. The report form entitled "Accident Report and Investigation Form" (Appendix H) is to be used for this purpose.

All representatives contacted by telephone are to receive a copy of this report. In addition to filling out the Accident Report and Investigation Form, if a Roux employee is involved in a motor vehicle accident, the employee must also complete the Acord form (Appendix I).

For reporting purposes, the term accident refers to fatalities, lost time injuries, spill or exposure to hazardous materials (radioactive materials, toxic materials, explosive or flammable materials), fire, explosion, property damage, or potential occurrence (i.e., near miss) of the above.

Any information released from the health care provider, which is not deemed confidential patient information, is to be attached to the appropriate form. Any medical information, which is released by patient consent, is to be filed in the individual's medical record and treated as confidential.

13.4 Personnel Exposure

Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area thoroughly, then provide appropriate medical attention. Eyes should be rinsed for 15 minutes upon chemical contamination.

Inhalation: Move to fresh air and/or, if necessary, decontaminate/transport to hospital.

Ingestion: Decontamination and transport to emergency medical facility.

Puncture Wound
or Laceration: Decontamination and transport to emergency medical facility.

13.5 Adverse Weather Conditions

In the event of adverse weather conditions, the PM/SSO or project manager will determine if work can continue without sacrificing the health and safety of all field workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress and heat-related injuries.
- Potential for cold stress and cold-related injuries.
- Treacherous weather-related conditions.
- Limited visibility.
- Electrical storm potential.

Site activities will be limited to daylight hours and acceptable weather conditions. Inclement working conditions include heavy rain, fog, high winds, and lightning. Observe daily weather reports and evacuate if necessary in case of inclement weather conditions.

13.5.1 Electrical Storm Guidelines

In the event that lightning and/or thunder are observed while working onsite, all onsite activities shall stop and personnel shall seek proper shelter (e.g., substantial building, enclosed vehicle, etc.). Work shall not resume until the threat of lightning has subsided and no lightning or thunder has been observed for 30 minutes. If the possibility of lightning is forecast for the day, advise the onsite personnel of the risks and proper procedure at the pre-work safety briefing. Continuously monitor for changing weather conditions and allow enough time to properly stop work if lightning is forecast.

14.0 LOGS, REPORTS AND RECORD KEEPING

The following is a summary of required health and safety logs, reports, and record keeping for this project.

14.1 Medical and Training Records

The employer keeps medical and training records. The subcontractor employer must provide verification of training and medical qualifications to the PM/SSO. The PM/SSO will keep a log of personnel meeting appropriate training and medical qualifications for Site work. The log will be kept in the project file. Roux Associates will maintain medical records in accordance with 29 CFR 1910.20.

14.2 Onsite Log

The PM/SSO or project manager will keep a log of onsite personnel daily in the designated field book.

14.3 Exposure Records

Applicable personal monitoring results, laboratory reports, calculations, and air sampling data sheets are part of an employee exposure record. These records will be kept by Roux Associates in accordance with 29 CFR 1910.20.

14.4 Lessons Learned Reports

A lessons learned report must be completed following procedures given in Appendix J. The originals will be sent to Roux Associates for maintenance. Copies will be distributed as stated. A copy of the forms will be kept in the project file.

14.5 Accident/Incident Reports

For any injury (OSHA Recordable or not), including “FYI” injuries (injuries where pain was felt, but not even first aid treatment was needed), and illnesses, all work on the activity where the injury/illness occurred will be stopped. An accident/incident report must be completed following procedures given in Appendix H. The originals will be sent to Roux Associates for maintenance. Copies will be distributed as stated. A copy of the forms will be kept in the project file.

14.6 OSHA Form 300

An OSHA Form 300 (Log of Occupational Injuries and Illnesses) (Appendix K) will be kept at the Site. All reportable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to Roux Associates for maintenance.

14.7 Daily Health and Safety Briefing

The Daily Health and Safety Briefing form in Appendix E will be completed daily by the PM/SSO and submitted to the project manager.

15.0 FIELD TEAM REVIEW

Each Roux Associates employee or subcontractor shall sign this section after site-specific training is completed and before being permitted to work at the Site.

I have read and had Roux Associates verbally review this Health and Safety Plan prepared for this Site with me. I understand and will comply with the provisions contained therein.

Site/Project: 1022 Old Country Road, Plainview, New York

Date	Name	Signature	Company

1. Toxicological, Physical and Chemical Properties of Compounds Potentially Present at the Site
2. Action Levels for Worker Breathing Zone

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 1022 Old Country Road, Plainview, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,2,4-Trimethylbenzene	95-63-6	TWA 25 ppm (125 mg/m ³)	TWA 25 ppm (125 mg/m ³)	None established	N.D.	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, fatigue, dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood	Clear, colorless liquid with a distinctive, aromatic odor. BP: 337°F FLP: 112°F UEL: 6.4% LEL: 0.9% Class II Flammable Liquid
1,2-Dichlorobenzene	95-50-1	TWA 25 ppm STEL 50 ppm	C 50 ppm (300 mg/m ³)	C 50 ppm (300 mg/m ³)	200 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; liver, kidney damage; skin blisters	Eyes, skin, respiratory system, liver, kidneys	Colorless to pale-yellow liquid with a pleasant, aromatic odor. [herbicide] BP: 357°F FLP: 151°F UEL: 9.2% LEL: 2.2% Class IIIA Combustible Liquid
1,2-Dichloroethane	107-06-2	TWA 10 ppm	Ca TWA 1 ppm (4 mg/m ³) STEL 2 ppm (8 mg/m ³)	TWA 50 ppm C 100 ppm 200 ppm [5-minute maximum peak in any 3 hours]	Ca [50 ppm]	inhalation, ingestion, skin absorption, skin and/or eye contact	Irritation eyes, corneal opacity; central nervous system depression; nausea, vomiting; dermatitis; liver, kidney, cardiovascular system damage; [potential occupational carcinogen]	Eyes, skin, kidneys, liver, central nervous system, cardiovascular system	Colorless liquid with a pleasant, chloroform-like odor. [Note: Decomposes slowly, becomes acidic & darkens in color.] BP: 182°F FLP: 56°F UEL: 16% LEL: 6.2% Class IB Flammable Liquid
1,2-Dichloroethene (total)	540-59-0	TWA 200 ppm (790 mg/m ³)	TWA 200 ppm (790 mg/m ³)	TWA 200 ppm (790 mg/m ³)	1000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; central nervous system depression	Eyes, respiratory system, central nervous system	Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor BP: 118-140°F FLP: 36-39°F UEL: 12.8% LEL: 5.6% Class IB Flammable Liquid
1,3,5-Trimethylbenzene	108-67-8	None established	TWA 25 ppm (125mg/m ³)	None established	N.D.	Inhalation; ingestion; skin and/or eye contact	Eye, skin, nose, and throat, resp syst irritation; bronchitis; hypochromic anemia; headache, drowsiness, weakness, dizziness, nausea, incoordination, vomit, confusion; chemical pneumonitis	Eyes, skin, resp sys, CNS, blood	Clear, colorless liquid with a distinctive, aromatic odor BP: 329°F FLP: 122°F Class II Flammable liquid
1,3,5-Trimethylbenzene	108-67-8	TWA 25 ppm (125 mg/m ³)	TWA 25 ppm (125 mg/m ³)	None established	N.D.	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)	Eyes, skin, respiratory system, central nervous system, blood	Clear, colorless liquid with a distinctive, aromatic odor. BP: 329°F FLP: 122°F Class II Flammable Liquid

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 1022 Old Country Road, Plainview, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
1,4-Dichlorobenzene	106-46-7	TWA 10 ppm	Ca	TWA 75 ppm (450 mg/m ³)	Ca [150 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Eye irritation, swelling periorbital (situated around the eye); profuse rhinitis; headache, anorexia, nausea, vomiting; weight loss, jaundice, cirrhosis; in animals: liver, kidney injury; [potential occupational carcinogen]	Liver, respiratory system, eyes, kidneys, skin	Colorless or white crystalline solid with a mothball-like odor. [insecticide] BP: 345°F F.P.: 150°F LEL: 2.5% Combustible Solid
2,4-Dimethylphenol	105-67-9	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system, mouth, throat, stomach; dizziness, weakness, fatigue, nausea, headache; systemic damage; moderate to severe eye injury.	Skin, CVS, eyes, CNS	Clear, colorless liquid with a faint ether or chloroform-like odor BP: 178°F
2-Butanone (MEK)	78-93-3	TWA 200 ppm (590 mg/m ³) STEL 300 ppm (885 mg/m ³)	TWA 200 ppm (590 mg/m ³) STEL 300 ppm (885 mg/m ³)	TWA 200 ppm (590 mg/m ³)	3000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor. BP: 175°F F.P.: 16°F UEL(200°F): 11.4% LEL(200°F): 1.4% Class IB Flammable Liquid
Acenaphthene	83-32-9	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory system	Eyes, skin, respiratory system	Brown solid
Acetone	67-64-1	TWA 500 ppm STEL 50 ppm	TWA 250 ppm (590 mg/m ³)	TWA 1000 ppm (2400 mg/m ³)	2500 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; headache, dizziness, central nervous system depression; dermatitis	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a fragrant, mint-like odor BP: 133°F F.P.: 0°F UEL: 12.8% LEL: 2.5% Class IB Flammable Liquid
Anthracene	65996-93-2	TWA 0.2 mg/m ³	Ca TWA 0.1 mg/m ³ (cyclohexane-extractable fraction)	TWA 0.2 mg/m ³ (benzene-soluble fraction)	Ca [80 mg/m ³]	inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue. Combustible Solids
Antimony	7440-36-0	TWA 0.5 mg/m ³	TWA 0.5 mg/m ³	TWA 0.5 mg/m ³	50 mg/m ³ (as Sb)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, mouth; cough; dizziness; headache; nausea, vomiting, diarrhea; stomach cramps; insomnia; anorexia; unable to smell properly	Eyes, skin, respiratory system, cardiovascular system	Silver-white, lustrous, hard, brittle solid; scale-like crystals; or a dark-gray, lustrous powder. BP: 2975°F
Arsenic (inorganic)	7440-38-2 (metal)	TWA 0.01 mg/m ³	Ca C 0.002 mg/m ³ [15-min]	TWA 0.010 mg/m ³	Ca [5 mg/m ³ (as As)]	Inhalation; ingestion; skin absorption; skin and/or eye contact	Ulceration of nasal septum, dermatitis, GI disturbances, peripheral neuropathy, resp irritation, hyperpigmentation of skin, [potential occupational carcinogen]	Liver, kidneys, skin, lungs, lymphatic sys	Metal: sliver-gray or tin-white, brittle, odorless solid BP: sublimes
Asbestos	1332-21-4	TWA 0.1 f/cc	Ca 100,000 fibers/m ³	TWA 0.1 fiber/cm ³	Ca [IDLH value has not been determined]	Inhalation; ingestion; skin and/or eye contact	Asbestosis (chronic exposure), dyspnea, interstitial fibrosis, restricted pulmonary function, finger clubbing, irritation eyes, [potential occupational carcinogen]	Respiratory system, eyes,	White or greenish (chrysotile), blue (crocidolite), or gray-green (amosite), fibrous, odorless solids. BP: decomposes

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 1022 Old Country Road, Plainview, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Asphalt fumes	8052-42-4	TWA 0.5 mg/m ³ (fumes)	Ca C 5 mg/m ³ [15 min]	None established	Ca [IDLH value has not been determined]	Skin absorption; inhalation; skin and/or eye contact	Irritation eyes, resp sys	Eyes, respiratory system	Black or dark brown cement-like substance Combustible solid
Barium	7440-39-3	TWA 0.5 mg/m ³	None established	TWA 0.5 mg/m ³	None established	Inhalation, ingestion, skin contact	Irritation skin, respiratory system,	(Skin, eyes, respiratory system	Yellow white powder BP: 1640 C
Benzene	71-43-2	TWA 0.5 ppm STEL 2.5 ppm	Ca TWA 0.1 ppm STEL 1 ppm	TWA 1 ppm STEL 5 ppm	Ca [500 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]	Eyes, skin, respiratory system, blood, central nervous system, bone marrow	Colorless to light yellow liquid with an aromatic odor [Note: Solid below 42 °F] BP: 176°F Fl.Pt = 12°F LEL: 1.2% UEL: 7.8% Class B Flammable liquid
Benzo[a]anthracene	56-55-3	None established	None established	None established	None established	Inhalation; ingestion; skin absorption; skin and/or eye contact	Irritation eyes, skin, respiratory system, CNS	Skin	Pale Yellow crystal, solid BP: 438 C
Benzo[a]pyrene	50-32-8	None established	TWA 0.1 mg/m ³	TWA 0.2 mg/m ³	None established	Inhalation; ingestion; skin absorption; skin and/or eye contact	POISON. This material is an experimental carcinogen, mutagen, tumorigen, neoplastigen and teratogen. It is a probable carcinogen in humans and a known human mutagen. IARC Group 2A carcinogen. It is believed to cause bladder, skin and lung cancer. Exposure to it may damage the developing foetus. May cause reproductive damage. Skin, respiratory and eye irritant or burns.	Skin, eye, bladder, lung, reproductive	Yellow crystals or powder [found in cigarette smoke, coal tar, fuel exhaust gas and in many other sources] BP: 495 C
Benzo[b]fluoranthene	205-99-2	None established	TWA 0.1 mg/m ³	TWA 0.2 mg/m ³	None established	Inhalation; ingestion; skin and/or eye contact	No data were identified on the toxicity of benzo[b]fluoranthene to humans. Based on results of studies in animals, IARC concluded that benzo[b]fluoranthene is possibly carcinogenic to humans	Respiratory system, skin, bladder, kidneys	Off-white to tan powder
Benzo[k]fluoranthene	207-08-9	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, respiratory tract, gastrointestinal; fatal if swallowed, inhaled, absorbed through the skin; vomiting, nausea, diarrhea	Lungs, respiratory system	Yellow crystals BP: 480 C

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 1022 Old Country Road, Plainview, New York

Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Beryllium	7440-41-7 (metal)	TWA 0.002 mg/m ³	Ca C 0.0005 mg/m ³	TWA 0.002 mg/m ³ C 0.005 mg/m ³ (30 minutes) with a maximum peak of 0.025 mg/m ³	Ca [4 mg/m ³ (as Be)]	inhalation, skin and/or eye contact	Berylliosis (chronic exposure): anorexia, weight loss, lassitude (weakness, exhaustion), chest pain, cough, clubbing of fingers, cyanosis, pulmonary insufficiency; irritation eyes; dermatitis; [potential occupational carcinogen]	Eyes, skin, respiratory system	Metal: A hard, brittle, gray-white solid. BP: 4532°F
Bis(2-ethylhexyl) phthalate	117-81-7	TWA 5 mg/m ³	TWA 5 mg/m ³ STEL 10 mg/m ³ (do not exceed during any 15-minute work period)	TWA 5 mg/m ³	None established	inhalation, skin and/or eye contact	Irritation eyes, skin, nose, throat; affect the nervous system and liver; damage to male reproductive glands	Eyes, skin, nose, respiratory system, nervous system, reproductive system, liver	Colorless to light colored, thick liquid with slight odor
Butane	106-97-8	TWA 1000 ppm	TWA 800 ppm (1900 mg/m ³)	None established	None established	inhalation, skin and/or eye contact (liquid)	Drowsiness, narcosis, asphyxia; liquid: frostbite	central nervous system	Colorless gas with a gasoline-like or natural gas odor. BP: 31°F UEL: 8.4% LEL: 1.6% Flammable Gas
Cadmium	7440-43-9 (metal)	TWA 0.01 mg/m ³	Ca	TWA 0.005 mg/m ³	Ca [9 mg/m ³ (as Cd)]	inhalation, ingestion	Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]	respiratory system, kidneys, prostate, blood	Metal: Silver-white, blue-tinged lustrous, odorless solid. BP: 1409°F
Carbon Disulfide	75-15-0	TWA 1 ppm	TWA 1 ppm (3 mg/m ³) STEL 10 ppm (30 mg/m ³) [skin]	TWA 20 ppm C 30 ppm 100 ppm (30-minute maximum peak)	500 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Dizziness, headache, poor sleep, lassitude (weakness, exhaustion), anxiety, anorexia, weight loss; psychosis; polyneuropathy; Parkinson-like syndrome; ocular changes; coronary heart disease; gastritis; kidney, liver injury; eye, skin burns; dermatitis; reproductive effects	central nervous system, peripheral nervous system, cardiovascular system, eyes, kidneys, liver, skin, reproductive system	Colorless to faint-yellow liquid with a sweet ether-like odor. BP: 116°F FLP: -22°F UEL: 50.0% LEL: 1.3% Class IB Flammable Liquid
Chlorobenzene	108-90-7	TWA 10 ppm	None established	TWA 75 ppm (350 mg/m ³)	1000 ppm	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose; drowsiness, incoordination; central nervous system depression; in animals: liver, lung, kidney injury	Eyes, skin, respiratory system, central nervous system, liver	Colorless liquid with an almond- like odor BP: 270°F FLP: 82°F UEL: 9.6% LEL: 1.3%
Chloroethane	75-00-3	TWA 100ppm	Handle with caution in the workplace	TWA 1000 ppm (2600 mg/m ³)	3800 ppm [10%LEL]	inhalation, skin absorption (liquid), ingestion (liquid), skin and/or eye contact	Incoordination, inebriation; abdominal cramps; cardiac arrhythmias, cardiac arrest; liver, kidney damage	Liver, kidneys, respiratory system, cardiovascular system, central nervous system	Colorless gas or liquid (below 54°F) with a pungent, ether-like odor. BP: 54°F FLP: NA (Gas) -58°F (Liquid) UEL: 15.4% LEL: 3.8%

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Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Chloroform	67-66-3	TWA 10 ppm	Ca STEL 2 ppm (9.78 mg/m ³) [60-minute]	C 50 ppm (240 mg/m ³)	Ca [500 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; dizziness, mental dullness, nausea, confusion; headache, lassitude (weakness, exhaustion); anesthesia; enlarged liver; [potential occupational carcinogen]	Liver, kidneys, heart, eyes, skin, central nervous system	Colorless liquid with a pleasant odor BP: 143°F
Chromium	7440-47-3	TWA 0.5 mg/m ³ (metal and Cr III compounds) TWA 0.05 mg/m ³ (water-soluble Cr IV compounds) TWA 0.01 mg/m ³ (insoluble Cr IV compounds)	TWA 0.5 mg/m ³	TWA 1 mg/m ³	250 mg/m ³ (as Cr)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; lung fibrosis (histologic)	Eyes, skin, respiratory system	Blue-white to steel-gray, lustrous, brittle, hard, odorless solid. BP: 4788°F
Chrysene; Phenanthrene; Pyrene; Coal tar pitch volatiles	65996-93-2	TWA 0.2 mg/m ³	Ca TWA 0.1 mg/m ³ (cyclohexane-extractable fraction)	TWA 0.2 mg/m ³ (benzene-soluble fraction)	Ca [80 mg/m ³]	Inhalation, skin and/or eye contact	Dermatitis, bronchitis, [potential occupational carcinogen]	Respiratory system, skin, bladder, kidneys	Black or dark-brown amorphous residue. Combustible Solids
cis-1,2-Dichloroethene	158-59-2	TWA 200 ppm	TWA 200 ppm	TWA 200 ppm	None established	inhalation, skin absorption, ingestion	Harmful if swallowed, inhaled, or absorbed through skin. Irritant. Narcotic. Suspected carcinogen	Skin	Colorless liquid BP: 60 C FLP: 4 C UEL: 12.8% LEL: 9.7 %
Copper	7440-50-8	TWA 0.2mg/m ³ (fume) 1 mg/m ³ (dusts and mists)	TWA 1 mg/m ³	TWA 1 mg/m ³	100 mg/m ³ (as Cu)	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, respiratory system; cough, dyspnea (breathing difficulty), wheezing	Eyes, skin, respiratory system, liver, kidneys (increase(d) risk with Wilson's disease)	Noncombustible Solid in bulk form, but powdered form may ignite. BP: 4703°F
Dibenzo[a,h]anthracene	53-70-3	None established	None established	None established	None established	Inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin	Eyes, skin; skin photosensitization.	Colorless crystalline powder BP: 524°C
Diesel Fuel #2	68476-34-6	None established	None established	Designated as an OSHA Select Carcinogen	None established	ingestion, skin and/or eye contact	Kidney damage; potential lung damage; suspected carcinogen; irritation of eyes, skin, respiratory tract; dizziness, headache, nausea; chemical pneumonitis (from aspiration of liquid); dry, red skin; irritant contact dermatitis; eye redness, pain.	Eyes, skin, kidneys	Clear yellow brown combustible liquid; floats on water; distinct diesel petroleum hydrocarbon odor. BP: 356-716°F FLP: 154.4-165.2°F LEL: 0.6% UEL: 7.0%
Ethylbenzene	100-41-4	TWA 100 ppm STEL 125 ppm	TWA 100 ppm (435 mg/m ³) STEL 125 ppm (545 mg/m ³)	TWA 100 ppm (435 mg/m ³)	800 ppm [10%LEL]	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with an aromatic odor. BP: 277°F FLP: 55°F UEL: 6.7% LEL: 0.8% Class IB Flammable Liquid
Fluoranthene	206-44-0	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible burns; heart and liver injury, pulmonary edema, respiratory arrest, gastrointestinal disturbances.	Heart, liver, lungs.	Yellow needles.

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Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Fluorene	86-73-7	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Irritation skin, digestive tract	Skin	White crystals BP: 563°F
Fuel Oil #2	68476-30-2	TWA 100mg/m ³ (aerosol and vapor, as total hydrocarbons)	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; CNS effects; nausea, vomiting, headache, cramping, dizziness, weakness, loss of coordination, drowsiness; kidney, liver damage	Eyes, skin, CNS	Clear or yellow to red oily liquid, kerosene-like odor BP: 347 - 689 °F UEL:5-6% LEL: 0.7-1.0%
Gasoline	8006-61-9	TWA 300 ppm STEL 500 ppm	Carcinogen	None established	Ca [IDLH value has not been determined]	Skin absorption; inhalation; ingestion; skin and/or eye contact	Eyes and skin irritation, mucous membrane; dermatitis; headache; listlessness, blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis; possible liver, kidney damage [Potential occupational carcinogen]	Eyes, skin, respiratory system, CNS, Liver, Kidneys	Clear liquid with a characteristic odor, aromatic FLPt = -45°F LEL = 1.4% UEL = 7.6% Class 1B Flammable Liquid
Hexachlorobutadiene	87-68-3	TWA 0.02 ppm	Ca TWA 0.02 ppm (0.24 mg/m ³) [skin]	None established	Ca [N.D.]	inhalation, skin absorption, ingestion, skin and/or eye contact	In animals: irritation eyes, skin, respiratory system; kidney damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, kidneys	Clear, colorless liquid with a mild, turpentine-like odor. BP: 419°F
Hydrogen Sulfide	7783-06-4	TWA (1 ppm) STEL (5 ppm) (adopted values for which changes are proposed in the NIC)	C 10 ppm (15 mg/m ³) [10-minute]	C 20 ppm 50 ppm [10-minute maximum peak]	100 ppm	inhalation, skin and/or eye contact	Irritation eyes, respiratory system; apnea, coma, convulsions; conjunctivitis, eye pain, lacrimation (discharge of tears), photophobia (abnormal visual intolerance to light), corneal vesiculation; dizziness, headache, lassitude (weakness, exhaustion), irritability, insomnia; gastrointestinal disturbance; liquid: frostbite	Eyes, respiratory system, central nervous system	Colorless gas with a strong odor of rotten eggs. BP: -77°F UEL: 44.0% LEL: 4.0% Flammable Gas
Indeno[1,2,3-cd]pyrene	193-39-5	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible human carcinogen (skin); weakness; affect liver, lung tissue, renal tissue; impairment of blood forming tissue	Skin	Fluorescent green-yellow crystalline solid BP: 536 C
Indeno[1,2,3-cd]pyrene	193-39-5	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; possible human carcinogen (skin); weakness; affect liver, lung tissue, renal tissue; impairment of blood forming tissue	Skin	Yellowish crystal solid BP: 536 C
Isopropylbenzene	98-82-8	TWA 50 ppm	TWA 50 ppm (245 mg/m ³) [skin]	TWA 50 ppm (245 mg/m ³) [skin]	900 ppm [10%LEL]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a sharp, penetrating, aromatic odor. BP: 306°F FLP: 96°F UEL: 6.5% LEL: 0.9%

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Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Lead	7439-92-1	TWA 0.05 mg/m ³	TWA (8-hour) 0.050 mg/m ³	TWA 0.050 mg/m ³	100 mg/m ³ (as Pb)	inhalation, ingestion, skin and/or eye contact	Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypertension	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue	A heavy, ductile, soft, gray solid. BP: 3164°F Noncombustible Solid in bulk form
Manganese	7439-96-5 (metal)	TWA 0.2 mg/m ³	TWA 1 mg/m ³ STEL 3 mg/m ³	C 5 mg/m ³	500 mg/m ³ (as Mn)	inhalation, ingestion	Manganism; asthenia, insomnia, mental confusion; metal fume fever: dry throat, cough, chest tightness, dyspnea (breathing difficulty), rales, flu-like fever; low-back pain; vomiting; malaise (vague feeling of discomfort); lassitude (weakness, exhaustion); kidney damage	respiratory system, central nervous system, blood, kidneys	A lustrous, brittle, silvery solid. BP: 3564°F
Mercury (organo) alkyl compounds (as Hg)	7439-97-6	TWA 0.01 mg/m ³ STEL 0.03 mg/m ³ [skin]	TWA 0.01 mg/m ³ STEL 0.03 mg/m ³ [skin]	TWA 0.01 mg/m ³ C 0.04 mg/m ³	2 mg/m ³ (as Hg)	inhalation, skin absorption, ingestion, skin and/or eye contact	Paresthesia; ataxia, dysarthria; vision, hearing disturbance; spasticity, jerking limbs; dizziness; salivation; lacrimation (discharge of tears); nausea, vomiting, diarrhea, constipation; skin burns; emotional disturbance; kidney injury; possible teratogenic effects	Eyes, skin, central nervous system, peripheral nervous system, kidneys	Appearance and odor vary depending upon the specific (organo) alkyl mercury compound
Mercury compounds [except (organo) alkyls] (as Hg) Mercury	7439-97-6	TWA 0.025 mg/m ³ (elemental and inorganic forms)	Hg Vapor: TWA 0.05 mg/m ³ [skin] Other: C 0.1 mg/m ³ [skin]	TWA 0.1 mg/m ³	10 mg/m ³ (as Hg)	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria	Eyes, skin, respiratory system, central nervous system, kidneys	Metal: Silver-white, heavy, odorless liquid. [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except (organo) alkyls.] BP: 674°F
Methyl tert-butyl ether (MTBE)	1634-04-4	TWA 50 ppm	No established REL	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, mucous membrane, respiratory; dizziness, nausea, headache, intoxication	Eyes, skin, mucous membrane, respiratory system, central nervous system	Colorless liquid BP: 55.2 C
Methylene Chloride	75-09-2	TWA 50 ppm, A3 - Ca suspected human carcinogen		TWA 25 ppm STEL 125 ppm	Ca [2300 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; lassitude (weakness, exhaustion), drowsiness, dizziness; numbness, tingle limbs; nausea; [potential occupational carcinogen]	Eyes, skin, cardiovascular system, central nervous system	Colorless liquid with a chloroform-like odor BP: 104°F UEL: 23% LEL: 13%

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Naphthalene	91-20-3	TWA 10 ppm STEL 15 ppm	TWA 10 ppm (50 mg/m ³) STEL 15 ppm (75 mg/m ³)	TWA 10 ppm (50 mg/m ³)	250 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage	Eyes, skin, blood, liver, kidneys, central nervous system	Colorless to brown solid with an odor of mothballs. BP: 424°F FLP: 174°F UEL: 5.9% LEL: 0.9%
n-Butylbenzene	104-51-8	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; CNS depression, lung damage; nausea, vomiting, headache, dizziness, weakness, loss of coordination, blurred vision, drowsiness, confusion, disorientation	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a sweet odor BP: 183 C FLP: 59 C UEL: 5.8% LEL: 0.8%
Nickel	7440-02-0 (Metal)	TWA 1.5 mg/m ³ (elemental) TWA 0.1 mg/m ³ (soluble inorganic compounds) TWA 0.2 mg/m ³ (insoluble inorganic compounds) TWA 0.1 mg/m ³ (Nickel subsulfide)	Ca TWA 0.015 mg/m ³	TWA 1 mg/m ³	Ca [10 mg/m ³ (as Ni)]	inhalation, ingestion, skin and/or eye contact	Sensitization dermatitis, allergic asthma, pneumonitis; [potential occupational carcinogen]	Nasal cavities, lungs, skin	Metal: Lustrous, silvery, odorless solid. BP: 5139°F
Nitrobenzene	98-95-3	TWA 1 ppm	TWA 1 ppm (5 mg/m ³) [skin]	TWA 1 ppm (5 mg/m ³) [skin]	200 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; anoxia; dermatitis; anemia; methemoglobinemia; in animals: liver, kidney damage; testicular effects	Eyes, skin, blood, liver, kidneys, cardiovascular system, reproductive system	Yellow, oily liquid with a pungent odor like paste shoe polish. BP: 411°F FLP: 190°F LEL(200°F): 1.8%
n-Propylbenzene	103-65-1	None established	None established	None established	None established	inhalation, ingestion, skin and/or eye contact	Harmful if swallowed, Irritation eyes, skin, digestive tract, respiratory tract, central nervous system	Eyes, skin, central nervous system, respiratory system	colorless or light yellow liquid BP: 159 C FLP: 47 C UEL: 6% LEL: 0.8%
Petroleum hydrocarbons (Petroleum distillates)	8002-05-9	None established	TWA 350 mg/m ³ C 1800 mg/m ³ [15 min]	TWA 500 ppm (2000 mg/m ³)	1,100 [10% LEL]	Inhalation; ingestion; skin and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, drowsiness, headache, nausea; dried/cracked skin; chemical pneumonitis	CNS, eyes, respiratory system, skin	Colorless liquid with a gasoline or kerosene-like odor BP: 86-460°F Fl. Pt = -40 to -86°F UEL: 5.9% LEL: 1.1% Flammable liquid
Phenol	108-95-2	TWA 5 ppm	TWA 5 ppm (19 mg/m ³) C 15.6 ppm (60 mg/m ³) [15-minute] [skin]	TWA 5 ppm (19 mg/m ³) [skin]	250 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose, throat; anorexia, weight loss; lassitude (weakness, exhaustion), muscle ache, pain; dark urine; cyanosis; liver, kidney damage; skin burns; dermatitis; ochronosis; tremor, convulsions, twitching	Eyes, skin, respiratory system, liver, kidneys	Colorless to light-pink, crystalline solid with a sweet, acrid odor. BP: 359°F UEL: 8.6% LEL: 1.8%

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p-Isopropyltoluene	99-87-6	None established	None established	None established	None established	inhalation, skin absorption, eye contact	Irritation skin	CNS, skin	Colorless, clear liquid, sweetish aromatic odor BP: 350.8°F Class III Flammable liquid
sec-Butylbenzene	135-98-8	None established	None established	None established	None established	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, upper airway; central nervous system, headache, dizziness; gastrointestinal disturbance	Respiratory system, central nervous system, eyes, skin;	Colorless liquid BP: 344°F FLP: 126 °F UEL: 6.9% LEL: 0.8% Combustible liquid
Selenium	7782-49-2	TWA 0.2 mg/m ³	TWA 0.2 mg/m ³	TWA 0.2 mg/m ³	1 mg/m ³ (as Se)	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat; visual disturbance; headache; chills, fever; dyspnea (breathing difficulty), bronchitis; metallic taste, garlic breath, gastrointestinal disturbance; dermatitis; eye, skin burns; in animals: anemia; liver necrosis, cirrhosis; kidney, spleen damage	Eyes, skin, respiratory system, liver, kidneys, blood, spleen	Amorphous or crystalline, red to gray solid. [Note: Occurs as an impurity in most sulfide ores.] BP: 1265°F
Silver	7440-22-4 (metal)	TWA 0.1 mg/m ³ (metal, dust, fumes) TWA 0.01 mg/m ³ (Soluble compounds, as Ag)	TWA 0.01 mg/m ³	TWA 0.01 mg/m ³	10 mg/m ³ (as Ag)	inhalation, ingestion, skin and/or eye contact	Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance	Nasal septum, skin, eyes	Metal: White, lustrous solid BP: 3632°F
tert-Butylbenzene	98-06-6	None established	None established	None established	None established	inhalation, skin absorption, ingestion,	Eye and respiratory irritant; CNS depression; liver or kidney damage	Respiratory system, central nervous system, eyes, liver, kidney	Colorless liquid with an aromatic odor BP: 168 - 169 C FLP: 34 C UEL: 5.6 % LEL: 0.8 %
Tetrachloroethene	127-18-4	TWA 25 ppm STEL 100 ppm (STEL) listed as A3, animal carcinogen	Ca Minimize workplace exposure concentrations	TWA 100 ppm C 200 ppm (for 5 minutes in any 3-hour period), with a maximum peak of 300 ppm	Ca [150 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, nose, throat, respiratory system; nausea; flush face, neck; dizziness, incoordination; headache, drowsiness; skin erythema (skin redness); liver damage; [potential occupational carcinogen]	Eyes, skin, respiratory system, liver, kidneys, central nervous system	Colorless liquid with a mild, chloroform-like odor. BP: 250°F Noncombustible Liquid
Toluene	108-88-3	TWA 20 ppm	TWA 100 ppm (375 mg/m ³) STEL 150 ppm (560 mg/m ³)	TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)	500 ppm	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage	Eyes, skin, respiratory system, central nervous system, liver, kidneys	Colorless liquid with a sweet, pungent, benzene-like odor. BP: 232°F FLP: 40°F UEL: 7.1% LEL: 1.1% Class IB Flammable Liquid

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Compound	CAS #	ACGIH TLV	NIOSH REL	OSHA PEL	IDLH	Routes of Exposure	Toxic Properties	Target Organs	Physical/Chemical Properties
Trichloroethene	79-01-6	TWA 10 ppm STEL 25 ppm	Ca	TWA 100 ppm C 200 ppm 300 ppm (5-minute maximum peak in any 2 hours)	Ca [1000 ppm]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin; headache, visual disturbance, lassitude (weakness, exhaustion), dizziness, tremor, drowsiness, nausea, vomiting; dermatitis; cardiac arrhythmias, paresthesia; liver injury; [potential occupational carcinogen]	Eyes, skin, respiratory system, heart, liver, kidneys, central nervous system	Colorless liquid (unless dyed blue) with a chloroform-like odor. BP: 189°F UEL(77°F): 10.5% LEL(77°F): 8%
Xylene (m, o & p isomers)	108-38-3, 95-47-6, 106-42-3	TWA 100 ppm (435 mg/m ³) STEL 150 ppm	TWA 100 ppm (435 mg/m ³)	TWA 100 ppm (435 mg/m ³)	900 ppm	Skin absorption, inhalation, ingestion, skin, and/or eye contact	Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis	Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys	Colorless liquid with an aromatic odor BP: 282°F, 292°F, 281°F Fl. Pt. 82°F, 90°F, 81°F LEL: 1.1%, 0.9%, 1.1% UEL: 7.0%, 6.7%, 7.0% Class C Flammable Liquid
Zinc	7440-66-6	TWA 10 mg/m ³ (Inhalable fraction)	None established	TWA 10 mg/m ³ (for zinc oxide fume)	None established	skin and/or eye contact, inhalation, ingestion	Irritation eyes, skin, respiratory tract; gastrointestinal disturbances	Eyes, skin, respiratory system	Bluish gray solid BP: 1664.6°F Flammable

Table 1. Toxicological, Physical, and Chemical Properties of Compounds Potentially Present at 1022 Old Country Road, Plainview, New York

References:

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Abbreviations:

ACGIH – American Conference of Governmental Industrial Hygienists

BP – Boiling point at 1 atmosphere, °F

C – Ceiling, is a concentration that should not be exceeded during and part of the working exposure.

Ca – Considered by NIOSH to be a potential occupational carcinogen.

CAS# Chemical Abstracts Service registry number which is unique for each chemical.

Fl. Pt. – Flash point

IDLH – Immediately Dangerous to Life and Health concentrations represent the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.

LEL – Lower explosive (flammable) limit in air, % by volume (at room temperature).

mg/m³ – Milligrams of substance per cubic meter of air

NIOSH – National Institute for Occupational Safety and Health.

OSHA – Occupational Safety and Health Administration

PEL – OSHA Permissible Exposure Limit (usually) a time weighted average concentration that must not be exceeded during any 8 hour work shift of a 40 hr work week.

ppm – Parts per million

REL – NIOSH Recommended Limit indicated a time weighted average concentration that must not be exceeded during any 10 hour work shift of a 40 hr work week.

STEL – Short-term exposure limit

TLV – ACGIH Threshold Limit Values (usually 8 hour time weighted average concentrations).

TWA – 8-hour, time-weighted average

UEL – Upper explosive (flammable) limit in air, % by volume (at room temperature)

TABLE 2
ACTION LEVELS FOR WORKER BREATHING ZONE

Instrument	Action Level *	Level of Respiratory Protection/Action
PID	0 to <5 ppm (one minute sustained)	Level D *
PID	>5 to <50 ppm (one minute sustained)	Utilize APR (Level C)
PID	>50 to <100 ppm (one minute sustained)	Level B
PID	>100 ppm	Stop work** (ventilate, apply foam)
CGI/H2S Meter	<5 ppm	Level D
CGI/H2S Meter	>5% to <25 ppm	Level B
CGI/H2S Meter	>25 ppm	Stop work**
CGI/CO Meter	>25 ppm	Level B
CGI/CO Meter	>50 ppm	Stop work** (ventilate area)
CGI/O2 Meter	<10% LEL, in excavation 19.5% oxygen – 23.5%	Level D Level D
CGI/O2 Meter	>10% LEL, in excavation <19.5% or >23.5% oxygen	Allow to vent, apply foam** Stop work, Oxygen Deficient or Enriched ATM**
CGI/CO Meter	>25 to <35 ppm (five minutes sustained) >35 ppm	Allow to vent ** (five minutes sustained) Stop work **

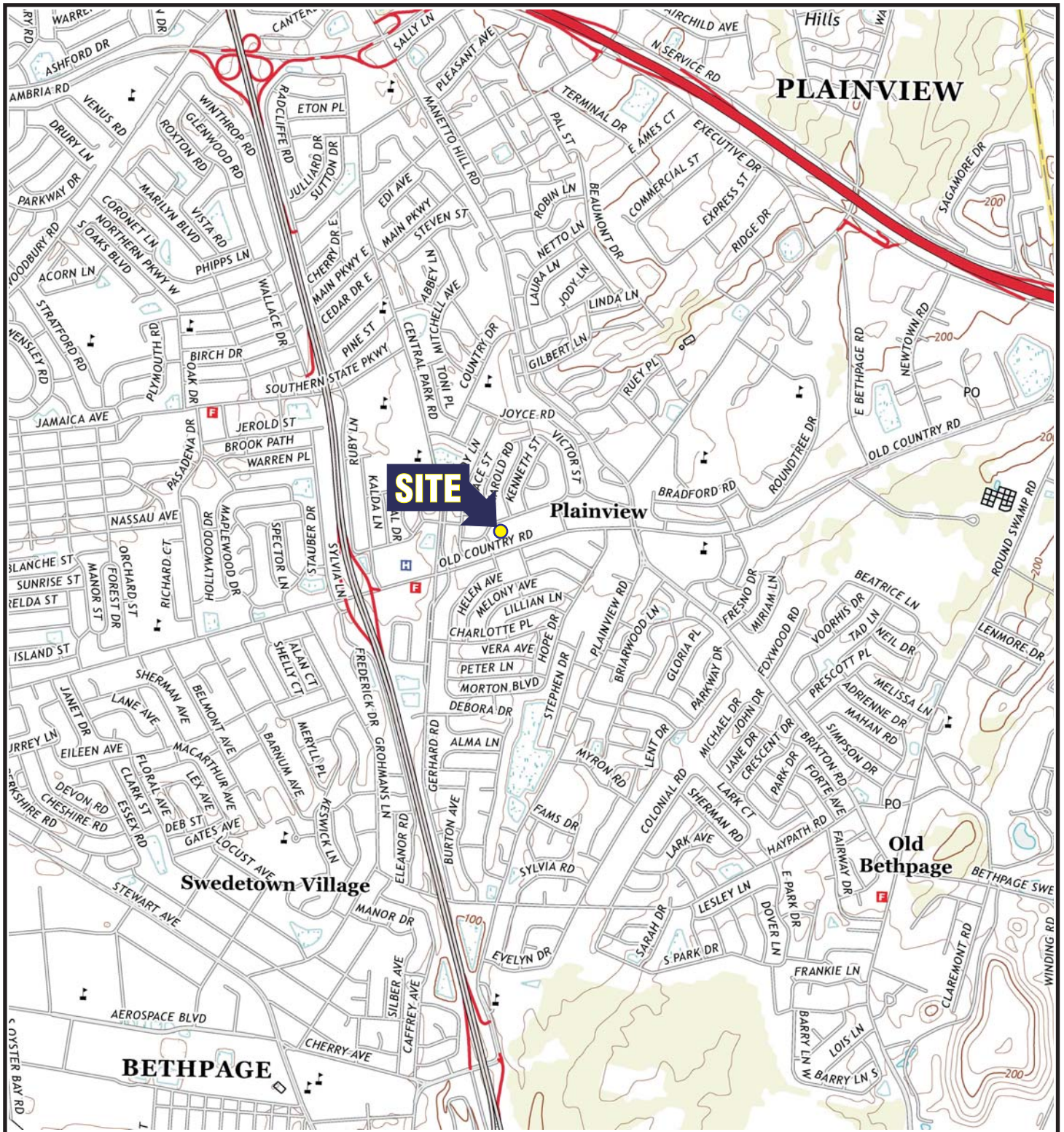
Note:

Action levels are based on above background levels.

* Instrument readings will be taken in the breathing zone of the workers, unless otherwise indicated.

** Suspend work in immediate area. Conduct air monitoring periodically to determine when work can continue. Implement mitigative measures.

1. Site Location Map
2. Hospital Route Map
3. Health Clinic Route Map



QUADRANGLE LOCATION



SOURCE:
USGS; 2013, HUNTINGTON, NY
7.5 Minute Topographic Quadrangle



Title:

SITE LOCATION MAP

1022 OLD COUNTRY ROAD
PLAINVIEW, NEW YORK

Prepared for:

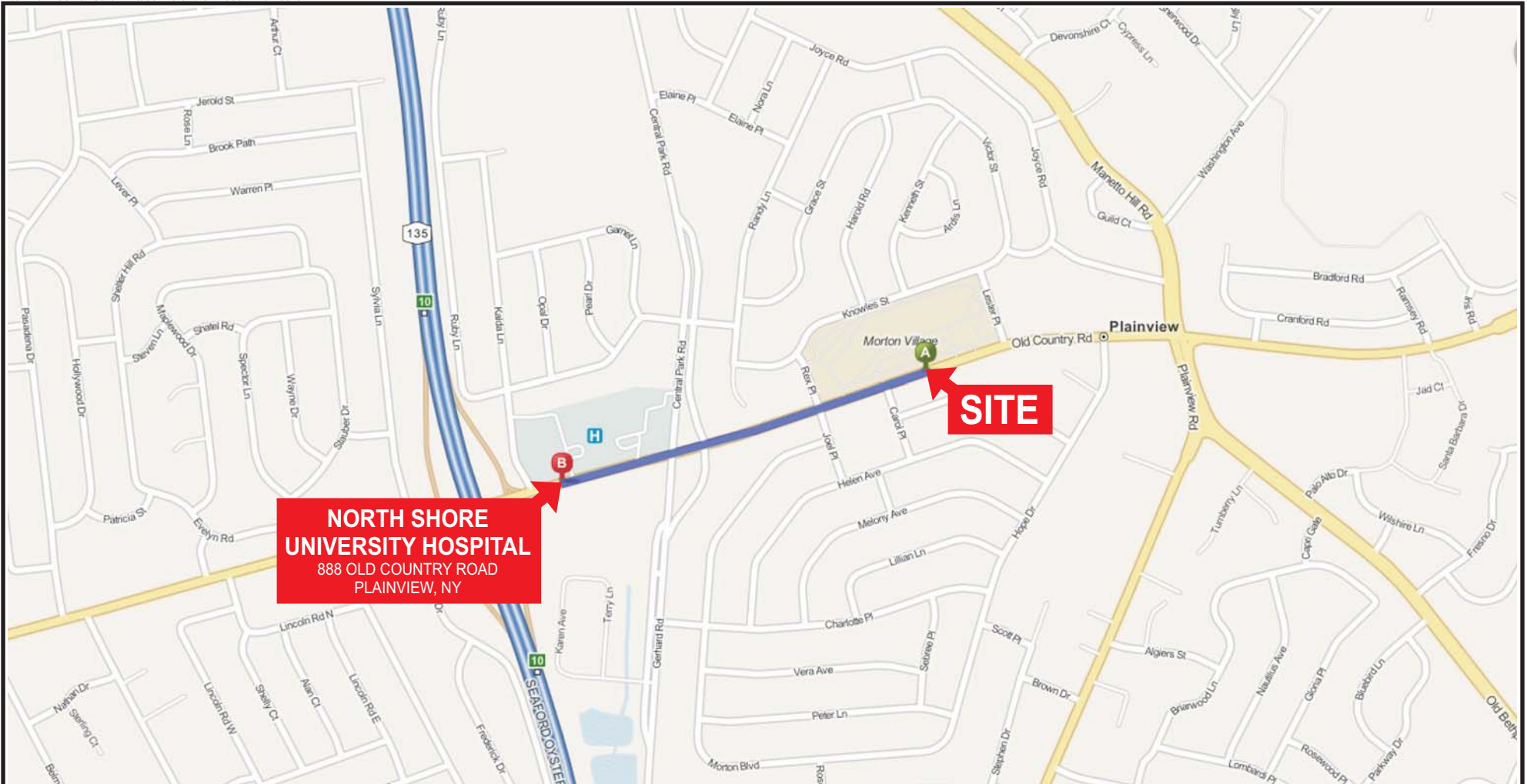
MORTON VILLAGE REALTY CO., INC

ROUX
ROUX ASSOCIATES, INC.
Environmental Consulting
& Management

Compiled by: J.W.	Date: 05JAN14
Prepared by: J.A.D.	Scale: AS SHOWN
Project Mgr.: J.W.	Project No.: 2517.0001Y000
File: 2517.0001Y101.01.CDR	

FIGURE

1



**NORTH SHORE
UNIVERSITY HOSPITAL**
888 OLD COUNTRY ROAD
PLAINVIEW, NY

SITE



Title:

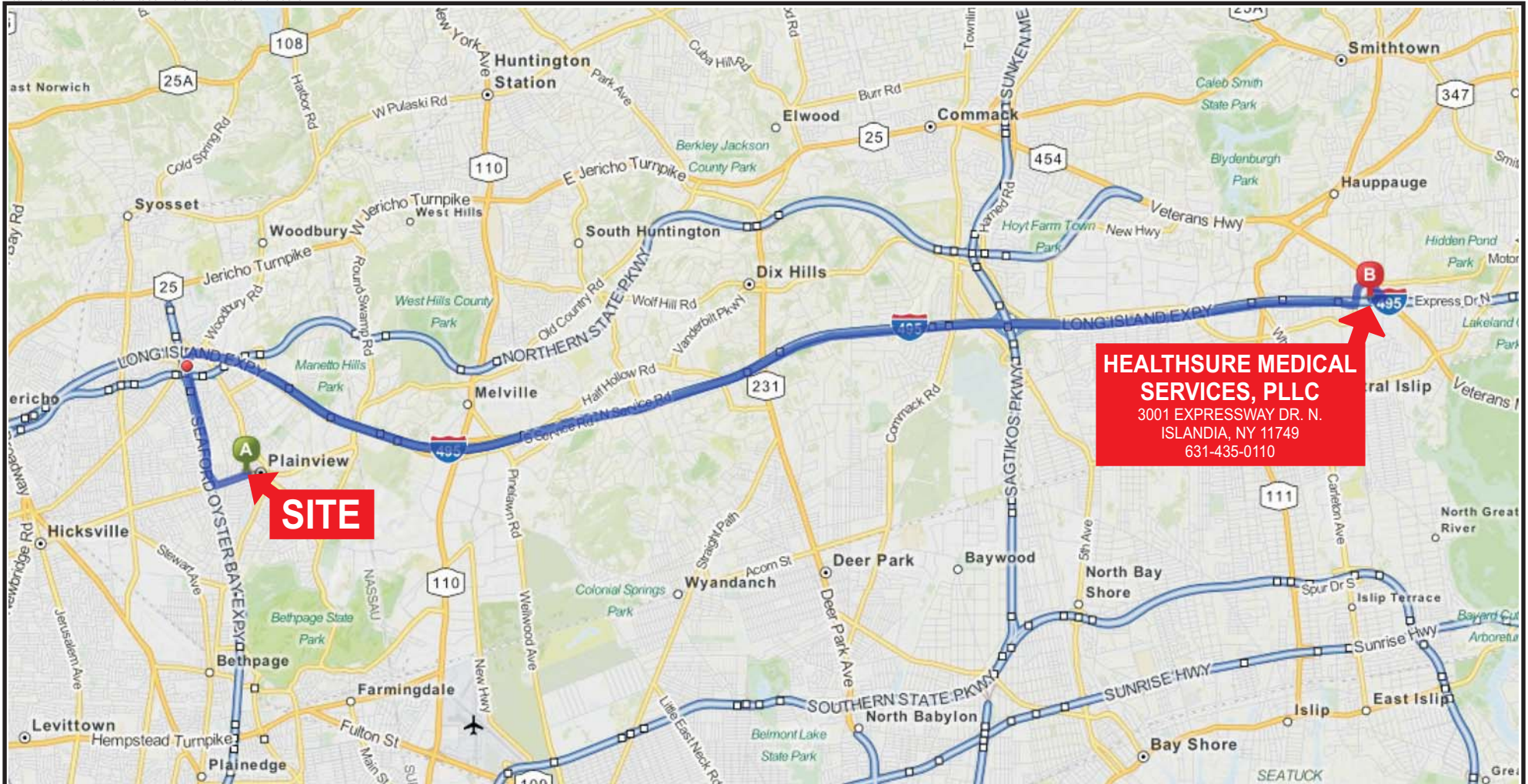
**HOSPITAL ROUTE
MORTON VILLAGE PLAZA PROJECT**

1022 OLD COUNTRY ROAD
PLAINVIEW, NEW YORK

Prepared for:

MORTON VILLAGE REALTY CO., INC

 ROUX ASSOCIATES, INC. <i>Environmental Consulting & Management</i>	Compiled by: J.W.	Date: 13JAN15	FIGURE 2
	Prepared by: J.A.D.	Scale: AS SHOWN	
	Project Mgr.: J.W.	Project No.: 2517.0001Y000	
	File: 2517.0001Y101.03.CDR		



HEALTHSURE MEDICAL SERVICES, PLLC
 3001 EXPRESSWAY DR. N.
 ISLANDIA, NY 11749
 631-435-0110

SITE

DIRECTIONS TO CLINIC

1. Head West on Old Country Rd (0.4mi)
2. Merge onto NY-135 North toward Syoset (1.6 mi)
3. Merge onto I-495 East via Exit 13E toward Riverhead (15.9 mi)
4. Take Exit 57 toward NY-454/Commack (0.2 mi)
5. Stay Straight to go onto Express Dr. S (0.7 mi)
6. Take the 1st Left onto County Hwy-67/Motor Pkwy (0.4 mi)
7. Turn Slight Right onto Veterans Hwy/NY-454 (0.3 mi)
8. Take the 1st Right onto Expressway Dr N. (0.2 mi)



Title:		
FIRST CARE AND OCCUPATIONAL HEALTH CLINIC ROUTE MORTON VILLAGE PLAZA PROJECT		
1022 OLD COUNTRY ROAD PLAINVIEW, NEW YORK		
Prepared for:		
MORTON VILLAGE REALTY CO., INC		
ROUX ROUX ASSOCIATES, INC. <i>Environmental Consulting & Management</i>	Compiled by: J.W.	Date: 13JAN15
	Prepared by: J.A.D.	Scale: AS SHOWN
	Project Mgr.: J.W.	Project No.: 2517.0001Y000
	File: 2517.0001Y101.03.CDR	
FIGURE		3

- A. Job Safety and Health (OSHA) Poster
- B. Material Safety Data Sheets (MSDS)
- C. Job Safety Analysis
- D. Heat and Cold Stress Guidelines
- E. Health and Safety Briefing/Tailgate Meeting Form
- F. Medical Data Form
- G. Generic Community Air Monitoring Plan
- H. Accident Report and Investigation Form
- I. Acord Automobile Loss Form
- J. Near Loss Reporting Form
- K. OSHA Log of Occupational Injuries and Illnesses

Job Safety and Health (OSHA) Poster

You Have a Right to a Safe and Healthful Workplace. IT'S THE LAW!

- You have the right to notify your employer or OSHA about workplace hazards. You may ask OSHA to keep your name confidential.
- You have the right to request an OSHA inspection if you believe that there are unsafe and unhealthful conditions in your workplace. You or your representative may participate in the inspection.
- You can file a complaint with OSHA within 30 days of discrimination by your employer for making safety and health complaints or for exercising your rights under the *OSH Act*.
- You have a right to see OSHA citations issued to your employer. Your employer must post the citations at or near the place of the alleged violation.
- Your employer must correct workplace hazards by the date indicated on the citation and must certify that these hazards have been reduced or eliminated.
- You have the right to copies of your medical records or records of your exposure to toxic and harmful substances or conditions.
- Your employer must post this notice in your workplace.

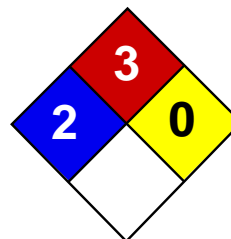


The *Occupational Safety and Health Act of 1970 (OSH Act)*, P.L. 91-596, assures safe and healthful working conditions for working men and women throughout the Nation. The Occupational Safety and Health Administration, in the U.S. Department of Labor, has the primary responsibility for administering the *OSH Act*. The rights listed here may vary depending on the particular circumstances. To file a complaint, report an emergency, or seek OSHA advice, assistance, or products, call 1-800-321-OSHA or your nearest OSHA office: • Atlanta (404) 562-2300 • Boston (617) 565-9860 • Chicago (312) 353-2220 • Dallas (214) 767-4731 • Denver (303) 844-1600 • Kansas City (816) 426-5861 • New York (212) 337-2378 • Philadelphia (215) 861-4900 • San Francisco (415) 975-4310 • Seattle (206) 553-5930. Teletypewriter (TTY) number is 1-877-889-5627. To file a complaint online or obtain more information on OSHA federal and state programs, visit OSHA's website at www.osha.gov. If your workplace is in a state operating under an OSHA-approved plan, your employer must post the required state equivalent of this poster.

1-800-321-OSHA

www.osha.gov

Material Safety Data Sheets (MSDS)



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Benzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Benzene

Catalog Codes: SLB1564, SLB3055, SLB2881

CAS#: 71-43-2

RTECS: CY1400000

TSCA: TSCA 8(b) inventory: Benzene

CI#: Not available.

Synonym: Benzol; Benzine

Chemical Name: Benzene

Chemical Formula: C6-H6

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Benzene	71-43-2	100

Toxicological Data on Ingredients: Benzene: ORAL (LD50): Acute: 930 mg/kg [Rat]. 4700 mg/kg [Mouse]. DERMAL (LD50): Acute: >9400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 10000 ppm 7 hours [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of eye contact (irritant), of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. **MUTAGENIC EFFECTS:** Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Classified Reproductive system/toxin/female [POSSIBLE]. The substance is toxic to blood, bone marrow, central nervous system (CNS). The substance may be toxic to liver, Urinary System. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

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

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 497.78°C (928°F)

Flash Points: CLOSED CUP: -11.1°C (12°F). (Setaflash)

Flammable Limits: LOWER: 1.2% UPPER: 7.8%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Slightly flammable to flammable in presence of oxidizing materials. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Explosive in presence of oxidizing materials, of acids.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Extremely flammable liquid and vapor. Vapor may cause flash fire. Reacts on contact with iodine heptafluoride gas. Dioxygenyl tetrafluoroborate is as very powerful oxidant. The addition of a small particle to small samples of benzene, at ambient temperature, causes ignition. Contact with sodium peroxide with benzene causes ignition. Benzene ignites in contact with powdered chromic anhydride. Vigorous or incandescent reaction with hydrogen + Raney nickel (above 210 C) and bromine trifluoride.

Special Remarks on Explosion Hazards:

Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction

of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimanganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 0.5 STEL: 2.5 (ppm) from ACGIH (TLV) [United States] TWA: 1.6 STEL: 8 (mg/m³) from ACGIH (TLV) [United States] TWA: 0.1 STEL: 1 from NIOSH TWA: 1 STEL: 5 (ppm) from OSHA (PEL) [United States] TWA: 10 (ppm) from OSHA (PEL) [United States] TWA: 3 (ppm) [United Kingdom (UK)] TWA: 1.6 (mg/m³) [United Kingdom (UK)] TWA: 1 (ppm) [Canada] TWA: 3.2 (mg/m³) [Canada] TWA: 0.5 (ppm) [Canada] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor:

Aromatic. Gasoline-like, rather pleasant. (Strong.)

Taste: Not available.

Molecular Weight: 78.11 g/mole

Color: Clear Colorless. Colorless to light yellow.

pH (1% soln/water): Not available.

Boiling Point: 80.1 (176.2°F)

Melting Point: 5.5°C (41.9°F)

Critical Temperature: 288.9°C (552°F)

Specific Gravity: 0.8787 @ 15 C (Water = 1)

Vapor Pressure: 10 kPa (@ 20°C)

Vapor Density: 2.8 (Air = 1)

Volatility: Not available.

Odor Threshold: 4.68 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; $\log(\text{oil/water}) = 2.1$

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Miscible in alcohol, chloroform, carbon disulfide oils, carbon tetrachloride, glacial acetic acid, diethyl ether, acetone. Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles.

Incompatibility with various substances: Highly reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Benzene vapors + chlorine and light causes explosion. Reacts explosively with bromine pentafluoride, chlorine, chlorine trifluoride, diborane, nitric acid, nitryl perchlorate, liquid oxygen, ozone, silver perchlorate. Benzene + pentafluoride and methoxide (from arsenic pentafluoride and potassium methoxide) in trichlorotrifluoroethane causes explosion. Interaction of nitryl perchlorate with benzene gave a slight explosion and flash. The solution of permanganic acid (or its explosive anhydride, dimanganese heptoxide) produced by interaction of permanganates and sulfuric acid will explode on contact with benzene. Peroxodisulfuric acid is a very powerful oxidant. Uncontrolled contact with benzene may cause explosion. Mixtures of peroxomonsulfuric acid with benzene explodes.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 930 mg/kg [Rat]. Acute dermal toxicity (LD50): >9400 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 10000 7 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A1 (Confirmed for human.) by ACGIH, 1 (Proven for human.) by IARC. **MUTAGENIC EFFECTS:** Classified POSSIBLE for human. Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. **DEVELOPMENTAL TOXICITY:** Classified Reproductive system/toxin/female [POSSIBLE]. Causes damage to the following organs: blood, bone marrow, central nervous system (CNS). May cause damage to the following organs: liver, Urinary System.

Other Toxic Effects on Humans:

Very hazardous in case of inhalation. Hazardous in case of skin contact (irritant, permeator), of ingestion.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects (female fertility, Embryotoxic and/or foetotoxic in animal) and birth defects. May affect genetic material (mutagenic). May cause cancer (tumorigenic, leukemia) Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes skin irritation. It can be absorbed through intact skin and affect the liver, blood, metabolism, and urinary system. Eyes: Causes eye irritation. Inhalation: Causes respiratory tract and mucous membrane irritation. Can be absorbed through the lungs. May affect behavior/Central and Peripheral nervous systems (somnolence, muscle weakness, general anesthetic, and other symptoms similar to ingestion), gastrointestinal tract (nausea), blood metabolism, urinary system. Ingestion: May be harmful if swallowed. May cause gastrointestinal tract irritation including vomiting. May affect behavior/Central and Peripheral nervous systems (convulsions, seizures, tremor, irritability, initial CNS stimulation followed by depression, loss of coordination, dizziness, headache, weakness, pallor, flushing), respiration (breathlessness and chest constriction), cardiovascular system, (shallow/rapid pulse), and blood.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

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

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Benzene UNNA: 1114 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Benzene California prop. 65 (no significant risk level): Benzene: 0.007 mg/day (value) California prop. 65: This product contains the following ingredients

for which the State of California has found to cause cancer which would require a warning under the statute: Benzene Connecticut carcinogen reporting list.: Benzene Connecticut hazardous material survey.: Benzene Illinois toxic substances disclosure to employee act: Benzene Illinois chemical safety act: Benzene New York release reporting list: Benzene Rhode Island RTK hazardous substances: Benzene Pennsylvania RTK: Benzene Minnesota: Benzene Michigan critical material: Benzene Massachusetts RTK: Benzene Massachusetts spill list: Benzene New Jersey: Benzene New Jersey spill list: Benzene Louisiana spill reporting: Benzene California Director's list of Hazardous Substances: Benzene TSCA 8(b) inventory: Benzene SARA 313 toxic chemical notification and release reporting: Benzene CERCLA: Hazardous substances.: Benzene: 10 lbs. (4.536 kg)

Other Regulations:

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

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable. R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer. R62- Possible risk of impaired fertility. S2- Keep out of the reach of children. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S39- Wear eye/face protection. S46- If swallowed, seek medical advice immediately and show this container or label. S53- Avoid exposure - obtain special instructions before use.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:35 PM

Last Updated: 11/06/2008 12:00 PM

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Material Safety Data Sheet
cis-1,2-Dichloroethylene, 97%

MSDS# 97773

Section 1 - Chemical Product and Company Identification

MSDS Name: cis-1,2-Dichloroethylene, 97%
Catalog Numbers: AC113380000, AC113380025, AC113380100, AC113380500
Synonyms: cis-Acetylene dichloride.

Company Identification: Acros Organics BVBA
Janssen Pharmaceuticaaan 3a
2440 Geel, Belgium

Company Identification: (USA) Acros Organics
One Reagent Lane
Fair Lawn, NJ 07410

For information in the US, call: 800-ACROS-01

For information in Europe, call: +32 14 57 52 11

Emergency Number, Europe: +32 14 57 52 99

Emergency Number US: 201-796-7100

CHEMTREC Phone Number, US: 800-424-9300

CHEMTREC Phone Number, Europe: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#: 156-59-2
Chemical Name: cis-1,2-Dichloroethylene
%: 97
EINECS#: 205-859-7

Hazard Symbols:

XN F



Risk Phrases:

11 20 52/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Warning! Flammable liquid and vapor. May cause respiratory tract irritation. Harmful if inhaled. May be harmful if swallowed. Causes eye and skin irritation. Unstabilized substance may polymerize. Target Organs: Central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes moderate eye irritation.

Skin: Causes moderate skin irritation. May cause dermatitis.

Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. May be harmful if swallowed. May cause central nervous system depression.

Inhalation: May cause respiratory tract irritation. May cause narcotic effects in high concentration.

Chronic:

Section 4 - First Aid Measures

Eyes: In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical aid.

Skin: In case of contact, flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical aid if irritation develops and persists. Wash clothing before reuse.

Ingestion: If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical aid.

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

Notes to Physician:

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Use water spray to keep fire-exposed containers cool. Flammable liquid and vapor. Fire or excessive heat may result in violent rupture of the container due to bulk polymerization. Vapors are heavier than air and may travel to a source of ignition and flash back. Vapors can spread along the ground and collect in low or confined areas. Hazardous polymerization may occur under fire conditions.

Extinguishing Media: Use water fog, dry chemical, carbon dioxide, or regular foam.

Autoignition Temperature: 440 deg C (824.00 deg F)

Flash Point: 6 deg C (42.80 deg F)

Explosion Limits: Lower: 9.70 vol %

Explosion Limits: Upper: 12.80 vol %

NFPA Rating: health: 2; flammability: 3; instability: 2;

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Remove all sources of ignition. Use a spark-proof tool. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Ground and bond containers when transferring material. Use spark-proof tools and explosion proof equipment. Avoid contact with eyes, skin, and clothing. Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Avoid ingestion and inhalation. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose empty containers to heat, sparks or open flames. Use only with adequate ventilation. Pure vapor will be uninhibited and may polymerize in vents or other confined spaces.

Storage: Keep away from sources of ignition. Store in a tightly closed container. Flammables-area. Store protected from light and air.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
cis-1,2-Dichloroethylene	200 ppm	none listed	none listed

OSHA Vacated PELs: cis-1,2-Dichloroethylene: None listed

Engineering Controls:

Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower.

Exposure Limits

Personal Protective Equipment

Eyes: Wear chemical splash goggles.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Color: Clear

Odor: Pleasant odor

pH: Not available

Vapor Pressure: 201 mm Hg @ 25 deg C

Vapor Density: 3.34 (air=1)

Evaporation Rate: Not available

Viscosity: Not available

Boiling Point: 60 deg C @ 760 mm Hg (140.00°F)

Freezing/Melting Point: -80 deg C (-112.00°F)

Decomposition Temperature: Not available

Solubility in water: Insoluble

Specific Gravity/Density: 1.2800

Molecular Formula: C₂H₂Cl₂

Molecular Weight: 96.94

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures. This material is a monomer and may polymerize under certain conditions if the stabilizer is lost.
Conditions to Avoid: Light, ignition sources, exposure to air, excess heat.
Incompatibilities with Other Materials: Strong oxidizing agents, strong bases, copper.
Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.
Hazardous Polymerization: May occur.

Section 11 - Toxicological Information

RTECS#: CAS# 156-59-2: KV9420000

RTECS:

LD50/LC50: CAS# 156-59-2: Inhalation, rat: LC50 = 13700 ppm;

Carcinogenicity: cis-1,2-Dichloroethylene - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.

Other: See actual entry in RTECS for complete information.

Section 12 - Ecological Information

Not available

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT

Shipping Name: 1,2-DICHLOROETHYLENE

Hazard Class: 3

UN Number: UN1150

Packing Group: II

Canada TDG

Shipping Name: Not available

Hazard Class:

UN Number:
Packing Group:

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN F

Risk Phrases:

R 11 Highly flammable.

R 20 Harmful by inhalation.

R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 7 Keep container tightly closed.

S 16 Keep away from sources of ignition - No smoking.

S 29 Do not empty into drains.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 156-59-2: Not available

Canada

CAS# 156-59-2 is listed on Canada's NDSL List

Canadian WHMIS Classifications: Not available

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 156-59-2 is not listed on Canada's Ingredient Disclosure List.

US Federal

TSCA

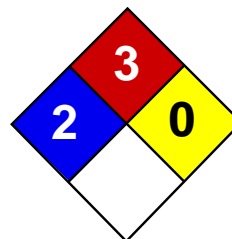
CAS# 156-59-2 is listed on the TSCA
Inventory.

Section 16 - Other Information

MSDS Creation Date: 2/09/1998

Revision #6 Date 7/20/2009

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages.



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet

Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C₈H₁₀

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (irritant, sensitizer). **CARCINOGENIC EFFECTS:** Classified 2B (Possible for human.) by IARC. **MUTAGENIC EFFECTS:** Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance may be toxic to central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

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

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

Inhalation:

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

Serious Inhalation:

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

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:

CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001) CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001) CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:

Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with eyes. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States] TWA: 435 STEL: 545 from OSHA (PEL) [United States] TWA: 435 STEL: 545 (mg/m³) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from NIOSH [United States] TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States] TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)] TWA: 100 STEL: 125 (ppm) [Belgium] TWA: 100 STEL: 125 (ppm) [Finland] TWA: 50 (ppm) [Norway] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; $\log(\text{oil/water}) = 3.1$

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:

Easily soluble in diethyl ether. Very slightly soluble in cold water or practically insoluble in water. Soluble in all proportions in Ethyl alcohol. Soluble in Carbon tetrachloride, Benzene. Insoluble in Ammonia. Slightly soluble in Chloroform. Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:

Can react vigorously with oxidizing materials. Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals:

Lethal Dose/Conc 50% Kill: LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg Lowest Published Lethal Dose/Conc: LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data. May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate. May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Can cause mild skin irritation. It can be absorbed through intact skin. Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm, it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS) Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include

headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and consciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987). Ingestion: Do not drink, pipet or siphon by mouth. May cause gastrointestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

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

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Ethylbenzene Illinois toxic substances disclosure to employee act: Ethylbenzene Illinois chemical safety act: Ethylbenzene New York release reporting list: Ethylbenzene Rhode Island RTK hazardous substances: Ethylbenzene Pennsylvania RTK: Ethylbenzene Minnesota: Ethylbenzene Massachusetts RTK: Ethylbenzene Massachusetts spill list: Ethylbenzene New Jersey: Ethylbenzene New Jersey spill list: Ethylbenzene Louisiana spill reporting: Ethylbenzene California Director's List of Hazardous Substances: Ethylbenzene TSCA 8(b) inventory: Ethylbenzene TSCA 4(a) proposed test rules: Ethylbenzene TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97 SARA 313 toxic chemical notification and release reporting: Ethylbenzene

Other Regulations:

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

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC). CLASSE D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S24/25- Avoid contact with skin and eyes. S29- Do not empty into drains.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information**References:**

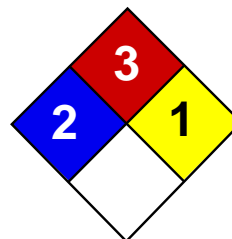
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey Hazardous Substance Fact Sheet -Ariel Global View -Reprotext System

Other Special Considerations: Not available.

Created: 10/09/2005 05:28 PM

Last Updated: 11/06/2008 12:00 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Cumene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Cumene

Catalog Codes: SLC3052

CAS#: 98-82-8

RTECS: GR8575000

TSCA: TSCA 8(b) inventory: Cumene

CI#: Not available.

Synonym: Isopropyl benzene; Cumol; 2-Phenyl propane; (1-Methylethyl)benzene

Chemical Name: Isopropylbenzene

Chemical Formula: C₆H₅CH(CH₃)₂

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Cumene	98-82-8	100

Toxicological Data on Ingredients: Cumene: ORAL (LD50): Acute: 1400 mg/kg [Rat]. 12750 mg/kg [Mouse]. DERMAL (LD50): Acute: 12300 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

Very hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

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

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 424°C (795.2°F)

Flash Points: CLOSED CUP: 36°C (96.8°F). OPEN CUP: 44°C (111.2°F).

Flammable Limits: LOWER: 0.9% UPPER: 6.5%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 50 CEIL: 75 (ppm) TWA: 245 CEIL: 365 (mg/m³) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 120.2 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 152.4°C (306.3°F)

Melting Point: -96°C (-140.8°F)

Critical Temperature: Not available.

Specific Gravity: 0.862 (Water = 1)

Vapor Pressure: 8 mm of Hg (@ 20°C)

Vapor Density: 4.14 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.2 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.7

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

Acute oral toxicity (LD50): 1400 mg/kg [Rat]. Acute dermal toxicity (LD50): 12300 mg/kg [Rabbit].

Chronic Effects on Humans: The substance is toxic to lungs, the nervous system, mucous membranes.

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

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Isopropylbenzene : UN1918 PG: III

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: Cumene Massachusetts RTK: Cumene TSCA 8(b) inventory: Cumene SARA 313 toxic chemical notification and release reporting: Cumene CERCLA: Hazardous substances.: Cumene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):

CLASS B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).

DSCL (EEC):

R10- Flammable. R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 1

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

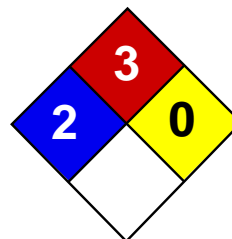
References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 11:43 AM

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

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet

Methyl tert-butyl ether MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl tert-butyl ether

Catalog Codes: SLM2152

CAS#: 1634-04-4

RTECS: KN5250000

TSCA: TSCA 8(b) inventory: Methyl tert-butyl ether

CI#: Not available.

Synonym:

Chemical Name: Methyl tert-Butyl Ether

Chemical Formula: C5-H12-O

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Methyl {tert-}butyl ether	1634-04-4	100

Toxicological Data on Ingredients: Methyl tert-butyl ether: ORAL (LD50): Acute: 4000 mg/kg [Rat]. 5960 mg/kg [Mouse]. VAPOR (LC50): Acute: 23576 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 224°C (435.2°F)

Flash Points: CLOSED CUP: -28°C (-18.4°F).

Flammable Limits: LOWER: 2.5% UPPER: 15.1%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Characteristic. (Strong.)

Taste: Not available.

Molecular Weight: 88.15 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 55.2°C (131.4°F)

Melting Point: -109°C (-164.2°F)

Critical Temperature: Not available.

Specific Gravity: 0.7405 (Water = 1)

Vapor Pressure: 245 mm of Hg (@ 20°C)

Vapor Density: 3.1 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:

Soluble in methanol, diethyl ether. Partially soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 4000 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 23576 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: The substance is toxic to lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:

Extremely hazardous in case of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Methyl tert-butyl ether : UN2398 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Pennsylvania RTK: Methyl tert-butyl ether Massachusetts RTK: Methyl tert-butyl ether TSCA 8(b) inventory: Methyl tert-butyl ether SARA 313 toxic chemical notification and release reporting: Methyl tert-butyl ether CERCLA: Hazardous substances.: Methyl tert-butyl ether

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable. R38- Irritating to skin. R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

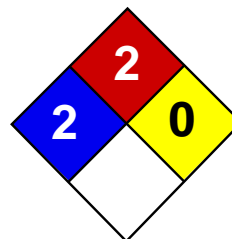
References: Not available.

Other Special Considerations: Not available.

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

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Health	2
Fire	2
Reactivity	0
Personal Protection	E

Material Safety Data Sheet Naphthalene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Naphthalene

Catalog Codes: SLN1789, SLN2401

CAS#: 91-20-3

RTECS: QJ0525000

TSCA: TSCA 8(b) inventory: Naphthalene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C₁₀H₈

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Naphthalene	91-20-3	100

Toxicological Data on Ingredients: Naphthalene: ORAL (LD50): Acute: 490 mg/kg [Rat]. 533 mg/kg [Mouse]. 1200 mg/kg [Guinea pig]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit]. VAPOR (LC50): Acute: 170 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant, permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

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

Ingestion:

Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 567°C (1052.6°F)

Flash Points: CLOSED CUP: 88°C (190.4°F). OPEN CUP: 79°C (174.2°F).

Flammable Limits: LOWER: 0.9% UPPER: 5.9%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable solid. **SMALL FIRE:** Use DRY chemical powder. **LARGE FIRE:** Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Flammable solid. Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

Israel: TWA: 10 (ppm) STEL: 15 (ppm) from ACGIH (TLV) [1995] TWA: 52 STEL: 79 (mg/m³) from ACGIH [1995]
Australia: STEL: 15 (ppm) Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid.)

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 128.19 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 218°C (424.4°F)

Melting Point: 80.2°C (176.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.162 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.038 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties:

Partially dispersed in hot water, methanol, n-octanol. Very slightly dispersed in cold water. See solubility in methanol, n-octanol.

Solubility:

Partially soluble in methanol, n-octanol. Very slightly soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Highly reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: May attack some forms of rubber and plastic

Polymerization: No.

Section 11: Toxicological Information

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

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 490 mg/kg [Rat]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 170 ppm 4 hour(s) [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Other Toxic Effects on Humans:

Very hazardous in case of ingestion. Hazardous in case of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 305.2 ppm 96 hour(s) [Trout].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Naphthalene, refined : UN1334 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:

Rhode Island RTK hazardous substances: Naphthalene Pennsylvania RTK: Naphthalene Florida: Naphthalene Minnesota: Naphthalene Massachusetts RTK: Naphthalene TSCA 8(b) inventory: Naphthalene TSCA 8(a) PAIR: Naphthalene TSCA 8(d) H and S data reporting: Naphthalene: 06/01/87 SARA 313 toxic chemical notification and release reporting: Naphthalene: 1% CERCLA: Hazardous substances.: Naphthalene: 100 lbs. (45.36 kg)

Other Regulations:

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

Other Classifications:

WHMIS (Canada):

CLASS B-4: Flammable solid. CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R36- Irritating to eyes. R40- Possible risks of irreversible effects. R48/22- Harmful: danger of serious damage to health by prolonged exposure if swallowed. R48/23- Toxic: danger of serious damage to health by prolonged exposure through inhalation. R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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MATERIAL SAFETY DATA SHEET

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MATHESON TRI-GAS, INC.
150 Allen Road Suite 302
Basking Ridge, New Jersey 07920
Information: 1-800-416-2505

Emergency Contact:
CHEMTREC 1-800-424-9300
Calls Originating Outside the US:
703-527-3887 (Collect Calls Accepted)

SUBSTANCE: BUTYL BENZENE

TRADE NAMES/SYNONYMS:

MTG MSDS 139; BUTYLBENZENE; 1-PHENYLBUTANE; N-BUTYLBENZENE; UN 2709;
MAT03530; RTECS CY9070000

CHEMICAL FAMILY: hydrocarbons, aromatic

CREATION DATE: Jan 24 1989

REVISION DATE: Dec 11 2008

2. COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: BUTYL BENZENE

CAS NUMBER: 104-51-8

PERCENTAGE: 100

3. HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=2 FIRE=2 REACTIVITY=0



EMERGENCY OVERVIEW:

COLOR: colorless

PHYSICAL FORM: liquid

ODOR: odorless

MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation, central nervous system depression

PHYSICAL HAZARDS: Combustible liquid and vapor.

POTENTIAL HEALTH EFFECTS:

INHALATION:

SHORT TERM EXPOSURE: irritation, vomiting, headache, symptoms of drunkenness, coma

LONG TERM EXPOSURE: lung damage

SKIN CONTACT:

SHORT TERM EXPOSURE: irritation, headache, symptoms of drunkenness

LONG TERM EXPOSURE: same as effects reported in short term exposure

EYE CONTACT:

SHORT TERM EXPOSURE: irritation, tearing

LONG TERM EXPOSURE: same as effects reported in short term exposure

INGESTION:

SHORT TERM EXPOSURE: vomiting, headache, symptoms of drunkenness, coma

LONG TERM EXPOSURE: lung damage

4. FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly clean and dry contaminated clothing and shoes before reuse.

EYE CONTACT: Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: DO NOT induce vomiting. Never make an unconscious person vomit or drink fluids. If vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention.

NOTE TO PHYSICIAN: For inhalation, consider oxygen. For ingestion, consider gastric lavage, catharsis and activated charcoal slurry.

5. FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Vapor/air mixtures are explosive above flash point. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back.

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny

entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

FLASH POINT: 160 F (71 C) (OC)
LOWER FLAMMABLE LIMIT: 0.8%
UPPER FLAMMABLE LIMIT: 5.8%
AUTOIGNITION: 770 F (410 C)
FLAMMABILITY CLASS (OSHA): IIIA

6. ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:

Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry.

7. HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards.

8. EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:

BUTYL BENZENE:

No occupational exposure limits established.

VENTILATION: Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: Under conditions of frequent use or heavy exposure, respiratory protection may be needed. Respiratory protection is ranked in order from minimum to maximum. Consider warning properties before

use.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: liquid

COLOR: colorless

ODOR: odorless

MOLECULAR WEIGHT: 134.21

MOLECULAR FORMULA: C₁₀-H₁₄

BOILING POINT: 356 F (180 C)

FREEZING POINT: -116 F (-82 C)

VAPOR PRESSURE: 1 mmHg @ 23 C

VAPOR DENSITY (air=1): 4.6

SPECIFIC GRAVITY (water=1): 0.9

WATER SOLUBILITY: insoluble

PH: Not available

VOLATILITY: Not available

ODOR THRESHOLD: Not available

EVAPORATION RATE: Not available

COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available

SOLVENT SOLUBILITY:

Miscible: alcohol, ether, benzene

10. STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.

CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.

INCOMPATIBILITIES: oxidizing materials

HAZARDOUS DECOMPOSITION:

Thermal decomposition products: miscellaneous decomposition products

POLYMERIZATION: Will not polymerize.

11. TOXICOLOGICAL INFORMATION

BUTYL BENZENE:

LOCAL EFFECTS:

Irritant: inhalation, skin, eye

TARGET ORGANS: central nervous system

12. ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

INVERTEBRATE TOXICITY: 340 ug/L 48 hour(s) EC50 (Immobilization) Water flea (Daphnia magna)

13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations.

14. TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:

PROPER SHIPPING NAME: Butyl benzenes

ID NUMBER: UN2709

HAZARD CLASS OR DIVISION: 3

PACKING GROUP: III

LABELING REQUIREMENTS: 3

MARINE POLLUTANT: BUTYL BENZENE



CANADIAN TRANSPORTATION OF DANGEROUS GOODS:

SHIPPING NAME: Butylbenzenes

UN NUMBER: UN2709

CLASS: 3

PACKING GROUP/CATEGORY: III

15. REGULATORY INFORMATION

U.S. REGULATIONS:

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart B): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart C): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B

and C):

ACUTE: Yes

CHRONIC: No

FIRE: Yes

REACTIVE: No

SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29 CFR 1910.119): Not regulated.

STATE REGULATIONS:

California Proposition 65: Not regulated.

CANADIAN REGULATIONS:

WHMIS CLASSIFICATION: Not determined.

NATIONAL INVENTORY STATUS:

U.S. INVENTORY (TSCA): Listed on inventory.

TSCA 12(b) EXPORT NOTIFICATION: Not listed.





CANADA INVENTORY (DSL/NDSL): Not determined.

16. OTHER INFORMATION

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Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
	<p>Combustible material; avoid heat and sources of ignition. The health risks of this compound have not been fully determined. Exposure may cause irritation of the skin, eyes, and respiratory system.</p>	   

Section I. Chemical Product and Company Identification

Chemical Name	n-Propylbenzene		
Catalog Number	P0523	Supplier	TCl America 9211 N. Harbortgate St. Portland OR 1-800-423-8616
Synonym	1-Phenylpropane		
Chemical Formula	CH ₃ CH ₂ CH ₂ C ₆ H ₅		
CAS Number	103-65-1	In case of Emergency Call	Chemtrec® (800) 424-9300 (U.S.) (703) 527-3887 (International)

Section II. Composition and Information on Ingredients

Chemical Name	CAS Number	Percent (%)	TLV/PEL	Toxicology Data
n-Propylbenzene	103-65-1	Min. 99.0 (GC)	Not available.	Rat LD ₅₀ (inhalation) 65000ppm/2H Rat LD ₅₀ (oral) 6040mg/kg

Section III. Hazards Identification

Acute Health Effects	No specific information is available in our data base regarding the toxic effects of this material for humans. However, exposure to any chemical should be kept to a minimum. Skin and eye contact may result in irritation. May be harmful if inhaled or ingested. Always follow safe industrial hygiene practices and wear proper protective equipment when handling this compound.
Chronic Health Effects	<p>CARCINOGENIC EFFECTS : Not available. MUTAGENIC EFFECTS : Not available. TERATOGENIC EFFECTS : Not available. DEVELOPMENTAL TOXICITYNot available. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.</p>

Section IV. First Aid Measures

Eye Contact	Check for and remove any contact lenses. IMMEDIATELY flush eyes with running water for at least 15 minutes. Keeping eyelids open. COLD water may be used. DO NOT use an eye ointment. Flush eyes with running water for a minimum of 15 minutes, occasionally lifting the upper eyelids. Seek medical attention. Treat symptomatically and supportively.
Skin Contact	After contact with skin, wash immediately with plenty of water. Gently and thorough wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. COLD water may be used. Cover the irritated skin with an emollient. Seek medical attention. Treat symptomatically and supportively. Wash any contaminated clothing before reusing.
Inhalation	Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform artificial respiration. WARNING: It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention and, if possible, show the chemical label. Treat symptomatically and supportively.
Ingestion	INDUCE VOMITING by sticking finger in throat. Lower the head so that the vomit will not reenter the mouth and throat. Loosen tight clothing such as a collar, tie, belt, or waistband. If the victim is not breathing, administer artificial respiration. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Seek immediate medical attention and, if possible, show the chemical label. Treat symptomatically and supportively.

Section V. Fire and Explosion Data

Flammability	Combustible.	Auto-Ignition	Not available.
Flash Points	47.8°C (118°F).	Flammable Limits	Not available.
Combustion Products	These products are toxic carbon oxides (CO, CO ₂).		
Fire Hazards	No specific information is available regarding the flammability of this compound in the presence of various materials.		
Explosion Hazards	Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available. No additional information is available regarding the risks of explosion.		

Continued on Next Page

Emergency phone number (800) 424-9300

Fire Fighting Media
and Instructions

SMALL FIRE: Use DRY chemicals, CO₂, alcohol foam or water spray.
LARGE FIRE: Use alcohol foam, water spray or fog.

Section VI. Accidental Release Measures

Spill Cleanup
Instructions

Combustible liquid.
Keep away from heat and sources of ignition. Mechanical exhaust required. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. DO NOT touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all sources of ignition. Consult federal, state, and/or local authorities for assistance on disposal.

Section VII. Handling and Storage

Handling and Storage
Information

COMBUSTIBLE. Handle with caution and minimize exposure. DO NOT ingest. Do not breathe gas, fumes, vapor or spray. Wear suitable protective clothing. If ingested, seek medical advice immediately and show the container or the label. Treat symptomatically and supportively.
Always store away from incompatible compounds such as oxidizing agents.

Section VIII. Exposure Controls/Personal Protection

Engineering Controls

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash station and safety shower is proximal to the work-station location.

Personal Protection

Splash goggles. Lab coat. Dust respirator. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.



Exposure Limits

Not available.

Section IX. Physical and Chemical Properties

Physical state @ 20°C	Liquid.	Solubility	Very slightly soluble in water. Soluble in alcohol, ether, all proportions in acetone, benzene, and petroleum ether.
Specific Gravity	0.86		
Molecular Weight	120.19	Partition Coefficient	Not available.
Boiling Point	159°C (318.2°F)	Vapor Pressure	Not available.
Melting Point	-99°C (-146.2°F)	Vapor Density	Not available.
Refractive Index	1.4920 @ 20°C	Volatility	Not available.
Critical Temperature	Not available.	Odor	Not available.
Viscosity	Not available.	Taste	Not available.

Section X. Stability and Reactivity Data

Stability	This material is stable if stored under proper conditions. (See Section VII for instructions)
Conditions of Instability	Avoid excessive heat and light.
Incompatibilities	Reactive with strong oxidizing agents.

Section XI. Toxicological Information

RTECS Number	DA8750000
Routes of Exposure	Eye contact. Ingestion. Inhalation.
Toxicity Data	Rat LD ₅₀ (inhalation) 65000ppm/2H Rat LD ₅₀ (oral) 6040mg/kg
Chronic Toxic Effects	CARCINOGENIC EFFECTS : Not available. MUTAGENIC EFFECTS : Not available. TERATOGENIC EFFECTS : Not available. DEVELOPMENTAL TOXICITY Not available. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.
Acute Toxic Effects	No specific information is available in our data base regarding the toxic effects of this material for humans. However, exposure to any chemical should be kept to a minimum. Skin and eye contact may result in irritation. May be harmful if inhaled or ingested. Always follow safe industrial hygiene practices and wear proper protective equipment when handling this compound.


Section XII. Ecological Information

Ecotoxicity	Not available.
Environmental Fate	Not available.

Section XIII. Disposal Considerations

Waste Disposal	Recycle to process, if possible. Consult your local or regional authorities. You may be able to dissolve or mix material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber system. Observe all federal, state, and local regulations when disposing of the substance.
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Section XIV. Transport Information

DOT Classification	DOT CLASS 3: Flammable liquid.
PIN Number	UN2364
Proper Shipping Name	n-Propylbenzene
Packing Group (PG)	III
DOT Pictograms	

Section XV. Other Regulatory Information and Pictograms

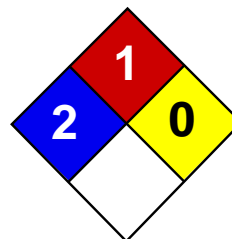
TSCA Chemical Inventory (EPA)	This compound is ON the EPA Toxic Substances Control Act (TSCA) inventory list.
WHMIS Classification (Canada)	WHMIS CLASS B-3: Combustible liquid with a flash point between 35°C (100°F) and 93.3°C (200°F).
EINECS Number (EEC)	203-132-9
EEC Risk Statements	R10- Flammable. R18- In use, may form flammable/explosive vapor-air mixture.
Japanese Regulatory Data	Not available.

Section XVI. Other Information

Version 1.0
Validated on 10/26/1998.
Printed 3/18/2005.

Notice to Reader

TCI laboratory chemicals are for research purposes only and are NOT intended for use as drugs, food additives, households, or pesticides. The information herein is believed to be correct, but does not claim to be all inclusive and should be used only as a guide. 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 chemical reagents must be handled with the recognition that their chemical, physiological, toxicological, and hazardous properties have not been fully investigated or determined. All chemical reagents should be handled only by individuals who are familiar with their potential hazards and who have been fully trained in proper safety, laboratory, and chemical handling procedures. Although certain hazards are described herein, we can not guarantee that these are the only hazards which exist. Our MSDS sheets are based only on data available at the time of shipping and are subject to change without notice as new information is obtained. Avoid long storage periods since the product is subject to degradation with age and may become more dangerous or hazardous. It is the responsibility of the user to request updated MSDS sheets for products that are stored for extended periods. Disposal of unused product must be undertaken by qualified personnel who are knowledgeable in all applicable regulations and follow all pertinent safety precautions including the use of appropriate protective equipment (e.g. protective goggles, protective clothing, breathing equipment, facial mask, fume hood). For proper handling and disposal, always comply with federal, state, and local regulations.



Health	2
Fire	1
Reactivity	0
Personal Protection	E

Material Safety Data Sheet Phenanthrene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Phenanthrene

Catalog Codes: SLP1318

CAS#: 85-01-8

RTECS: SF7175000

TSCA: TSCA 8(b) inventory: Phenanthrene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C₁₄H₁₀

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Phenanthrene	85-01-8	100

Toxicological Data on Ingredients: Phenanthrene: ORAL (LD50): Acute: 700 mg/kg [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant, sensitizer), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. Repeated or prolonged exposure is not known to aggravate medical condition.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:

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

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

Ingestion:

Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: OPEN CUP: 171°C (339.8°F).

Flammable Limits: Not available.

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:

Use appropriate tools to put the spilled solid in a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and dispose of according to local and regional authority requirements.

Large Spill:

Use a shovel to put the material into a convenient waste disposal container. Finish cleaning by spreading water on the contaminated surface and allow to evacuate through the sanitary system.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Wear suitable protective clothing In

case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes.

Storage:

Keep container dry. Keep in a cool place. Ground all equipment containing material. Keep container tightly closed. Keep in a cool, well-ventilated place. Combustible materials should be stored away from extreme heat and away from strong oxidizing agents.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid.

Odor: Not available.

Taste: Not available.

Molecular Weight: 178.22 g/mole

Color: Not available.

pH (1% soln/water): Not available.

Boiling Point: 340°C (644°F)

Melting Point: 101°C (213.8°F)

Critical Temperature: Not available.

Specific Gravity: 1.179 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 6.14 (Air = 1)

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Eye contact. Inhalation. Ingestion.

Toxicity to Animals: Acute oral toxicity (LD50): 700 mg/kg [Mouse].

Chronic Effects on Humans: Not available.

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant, sensitizer), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Not a DOT controlled material (United States).

Identification: Not applicable.

Special Provisions for Transport: Not applicable.

Section 15: Other Regulatory Information

Federal and State Regulations: TSCA 8(b) inventory: Phenanthrene

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada): Not controlled under WHMIS (Canada).

DSCL (EEC):

R36/38- Irritating to eyes and skin. R43- May cause sensitization by skin contact.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 1

Reactivity: 0

Personal Protection: E

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

Health: 2

Flammability: 1

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Splash goggles.

Section 16: Other Information

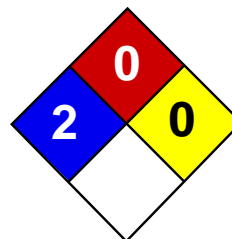
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 11:16 AM

Last Updated: 11/06/2008 12:00 PM

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Health	2
Fire	0
Reactivity	0
Personal Protection	G

Material Safety Data Sheet Tetrachloroethylene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Tetrachloroethylene

Catalog Codes: SLT3220

CAS#: 127-18-4

RTECS: KX3850000

TSCA: TSCA 8(b) inventory: Tetrachloroethylene

CI#: Not available.

Synonym: Perchloroethylene; 1,1,2,2-Tetrachloroethylene; Carbon bichloride; Carbon dichloride; Ankilostin; Didakene; Dilatin PT; Ethene, tetrachloro-; Ethylene tetrachloride; Perawin; Perchlor; Perclene; Perclene D; Percosolve; Tetrachloroethene; Tetraleno; Tetralox; Tetravec; Tetroguer; Tetropil

Chemical Name: Ethylene, tetrachloro-

Chemical Formula: C₂-Cl₄

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Tetrachloroethylene	127-18-4	100

Toxicological Data on Ingredients: Tetrachloroethylene: ORAL (LD50): Acute: 2629 mg/kg [Rat]. DERMAL (LD): Acute: >3228 mg/kg [Rabbit]. MIST(LC50): Acute: 34200 mg/m 8 hours [Rat]. VAPOR (LC50): Acute: 5200 ppm 4 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of eye contact (irritant), of ingestion.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (anticipated carcinogen) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, peripheral nervous system, respiratory tract, skin, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention if irritation occurs.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Non-flammable.

Auto-Ignition Temperature: Not applicable.

Flash Points: Not applicable.

Flammable Limits: Not applicable.

Products of Combustion: Not available.

Fire Hazards in Presence of Various Substances: Not applicable.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions: Not applicable.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Absorb with an inert material and put the spilled material in an appropriate waste disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Do not ingest. Do not breathe gas/fumes/ vapor/spray. Avoid contact with skin. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents, metals, acids, alkalis.

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

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal Protection:

Safety glasses. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 25 (ppm) from OSHA (PEL) [United States] TWA: 25 STEL: 100 (ppm) from ACGIH (TLV) [United States] TWA: 170 (mg/m3) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Ethereal.

Taste: Not available.

Molecular Weight: 165.83 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 121.3°C (250.3°F)

Melting Point: -22.3°C (-8.1°F)

Critical Temperature: 347.1°C (656.8°F)

Specific Gravity: 1.6227 (Water = 1)

Vapor Pressure: 1.7 kPa (@ 20°C)

Vapor Density: 5.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 5 - 50 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.4

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:

Miscible with alcohol, ether, chloroform, benzene, hexane. It dissolves in most of the fixed and volatile oils. Solubility in water: 0.015 g/100 ml @ 25 deg. C It slowly decomposes in water to yield Trichloroacetic and Hydrochloric acids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents, metals, acids, alkalis.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Oxidized by strong oxidizing agents. Incompatible with sodium hydroxide, finely divided or powdered metals such as zinc, aluminum, magnesium, potassium, chemically active metals such as lithium, beryllium, barium. Protect from light.

Special Remarks on Corrosivity: Slowly corrodes aluminum, iron, and zinc.

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2629 mg/kg [Rat]. Acute dermal toxicity (LD50): >3228 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5200 4 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2A (Probable for human.) by IARC, 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, peripheral nervous system, upper respiratory tract, skin, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of inhalation. Slightly hazardous in case of skin contact (permeator), of ingestion.

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose/Conc: LDL [Rabbit] - Route: Oral; Dose: 5000 mg/kg LDL [Dog] - Route: Oral; Dose: 4000 mg/kg LDL [Cat] - Route: Oral; Dose: 4000 mg/kg

Special Remarks on Chronic Effects on Humans:

May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic). May cause cancer.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes skin irritation with possible dermal blistering or burns. Symptoms may include redness, itching, pain, and possible dermal blistering or burns. It may be absorbed through the skin with possible systemic effects. A single prolonged skin exposure is not likely to result in the material being absorbed in harmful amounts. Eyes: Contact causes transient eye irritation, lacrimation. Vapors cause eye/conjunctival irritation. Symptoms may include redness and pain. Inhalation: The main route to occupational exposure is by inhalation since it is readily absorbed through the lungs. It causes respiratory tract irritation, . It can affect behavior/central nervous system (CNS depressant and anesthesia ranging from slight inebriation to death, vertigo, somnolence, anxiety, headache, excitement, hallucinations, muscle incoordination, dizziness, lightheadness, disorientation, seizures, emotional instability, stupor, coma). It may cause pulmonary edema Ingestion: It can cause nausea, vomiting, anorexia, diarrhea, bloody stool. It may affect the liver, urinary system (proteinuria, hematuria, renal failure, renal tubular disorder), heart (arrhythmias). It may affect behavior/central nervous system with symptoms similar to that of inhalation. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may result in excessive drying of the skin, and irritation. Ingestion/Inhalation: Chronic exposure can affect the liver (hepatitis, fatty liver degeneration), kidneys, spleen, and heart (irregular heartbeat/arrhythmias, cardiomyopathy, abnormal EEG), brain, behavior/central nervous system/peripheral nervous system (impaired memory, numbness of extremities, peripheral neuropathy and other

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 18.4 mg/l 96 hours [Fish (Fathead Minnow)]. 18 mg/l 48 hours [Daphnia (daphnia)]. 5 mg/l 96 hours [Fish (Rainbow Trout)]. 13 mg/l 96 hours [Fish (Bluegill sunfish)].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The product itself and its products of degradation are not toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

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

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Tetrachloroethylene UNNA: 1897 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Tetrachloroethylene California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer which would require a warning under the statute: Tetrachloroethylene Connecticut hazardous material survey.: Tetrachloroethylene Illinois toxic substances disclosure to employee act: Tetrachloroethylene Illinois chemical safety act: Tetrachloroethylene New York release reporting list: Tetrachloroethylene Rhode Island RTK hazardous substances: Tetrachloroethylene Pennsylvania RTK: Tetrachloroethylene Minnesota: Tetrachloroethylene Michigan critical material: Tetrachloroethylene Massachusetts RTK: Tetrachloroethylene Massachusetts spill list: Tetrachloroethylene New Jersey: Tetrachloroethylene New Jersey spill list: Tetrachloroethylene Louisiana spill reporting: Tetrachloroethylene California Director's List of Hazardous Substances: Tetrachloroethylene TSCA 8(b) inventory: Tetrachloroethylene TSCA 8(d) H and S data reporting: Tetrachloroethylene Effective date: 6/1/87; Sunset date: 6/1/97 SARA 313 toxic chemical notification and release reporting: Tetrachloroethylene CERCLA: Hazardous substances.: Tetrachloroethylene: 100 lbs. (45.36 kg)

Other Regulations:

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

Other Classifications:

WHMIS (Canada):

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R40- Possible risks of irreversible effects. R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S23- Do not breathe gas/fumes/vapour/spray S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37- Wear suitable gloves. S61- Avoid release to the environment. Refer to special instructions/Safety data sheets.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 0

Reactivity: 0

Personal Protection: g

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

Health: 2

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Safety glasses.

Section 16: Other Information

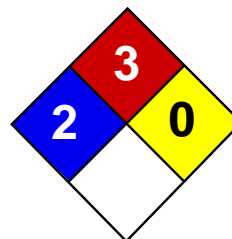
References: Not available.

Other Special Considerations: Not available.

Created: 10/10/2005 08:29 PM

Last Updated: 11/06/2008 12:00 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet Toluene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Toluene

Catalog Codes: SLT2857, SLT3277

CAS#: 108-88-3

RTECS: XS5250000

TSCA: TSCA 8(b) inventory: Toluene

CI#: Not available.

Synonym: Toluol, Tolu-Sol; Methylbenzene; Methacide; Phenylmethane; Methylbenzol

Chemical Name: Toluene

Chemical Formula: C6-H5-CH3 or C7-H8

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Toluene	108-88-3	100

Toxicological Data on Ingredients: Toluene: ORAL (LD50): Acute: 636 mg/kg [Rat]. DERMAL (LD50): Acute: 14100 mg/kg [Rabbit]. VAPOR (LC50): Acute: 49000 mg/m 4 hours [Rat]. 440 ppm 24 hours [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:

Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, the nervous system, liver, brain, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

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

Inhalation:

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

Serious Inhalation:

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

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. If large quantities of this material are swallowed, call a physician immediately. Loosen tight clothing such as a collar, tie, belt or waistband.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 480°C (896°F)

Flash Points: CLOSED CUP: 4.4444°C (40°F). (Setaflash) OPEN CUP: 16°C (60.8°F).

Flammable Limits: LOWER: 1.1% UPPER: 7.1%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable liquid, insoluble in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards:

Toluene forms explosive reaction with 1,3-dichloro-5,5-dimethyl-2,4-imidazolididione; dinitrogen tetraoxide; concentrated nitric acid, sulfuric acid + nitric acid; N₂O₄; AgClO₄; BrF₃; Uranium hexafluoride; sulfur dichloride. Also forms an explosive mixture with tetranitromethane.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Toxic flammable liquid, insoluble or very slightly soluble in water. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not get water inside container. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage**Precautions:**

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection**Engineering Controls:**

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

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 200 STEL: 500 CEIL: 300 (ppm) from OSHA (PEL) [United States] TWA: 50 (ppm) from ACGIH (TLV) [United States] SKIN TWA: 100 STEL: 150 from NIOSH [United States] TWA: 375 STEL: 560 (mg/m³) from NIOSH [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweet, pungent, Benzene-like.

Taste: Not available.

Molecular Weight: 92.14 g/mole

Color: Colorless.

pH (1% soln/water): Not applicable.

Boiling Point: 110.6°C (231.1°F)

Melting Point: -95°C (-139°F)

Critical Temperature: 318.6°C (605.5°F)

Specific Gravity: 0.8636 (Water = 1)

Vapor Pressure: 3.8 kPa (@ 25°C)

Vapor Density: 3.1 (Air = 1)

Volatility: Not available.

Odor Threshold: 1.6 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; $\log(\text{oil/water}) = 2.7$

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether, acetone.

Solubility:

Soluble in diethyl ether, acetone. Practically insoluble in cold water. Soluble in ethanol, benzene, chloroform, glacial acetic acid, carbon disulfide. Solubility in water: 0.561 g/l @ 25 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources (flames, sparks, static), incompatible materials

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Incompatible with strong oxidizers, silver perchlorate, sodium difluoride, Tetranitromethane, Uranium Hexafluoride. Frozen Bromine Trifluoride reacts violently with Toluene at -80 deg. C. Reacts chemically with nitrogen oxides, or halogens to form nitrotoluene, nitrobenzene, and nitrophenol and halogenated products, respectively.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 636 mg/kg [Rat]. Acute dermal toxicity (LD50): 14100 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 440 24 hours [Mouse].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH, 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, the nervous system, liver, brain, central nervous system (CNS).

Other Toxic Effects on Humans:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals:

Lowest Published Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Rabbit] - Route: Inhalation; Dose: 55000 ppm/40min

Special Remarks on Chronic Effects on Humans:

Detected in maternal milk in human. Passes through the placental barrier in human. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects and birth defects (teratogenic). May affect genetic material (mutagenic)

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes mild to moderate skin irritation. It can be absorbed to some extent through the skin. Eyes: Causes mild to moderate eye irritation with a burning sensation. Splash contact with eyes also causes conjunctivitis, blepharospasm, corneal edema, corneal abrasions. This usually resolves in 2 days. Inhalation: Inhalation of vapor may cause respiratory tract irritation causing coughing and wheezing, and nasal discharge. Inhalation of high concentrations may affect behavior and cause central nervous system effects characterized by nausea, headache, dizziness, tremors, restlessness, lightheadedness, exhilaration, memory loss, insomnia, impaired reaction time, drowsiness, ataxia, hallucinations, somnolence, muscle contraction or spasticity, unconsciousness and coma. Inhalation of high concentration of vapor may also affect the cardiovascular system (rapid heart beat, heart palpitations, increased or decreased blood pressure, dysrhythmia,), respiration (acute pulmonary edema, respiratory depression, apnea, asphyxia), cause vision disturbances and dilated pupils, and cause loss of appetite. Ingestion: Aspiration hazard. Aspiration of Toluene into the lungs may cause chemical pneumonitis. May cause irritation of the digestive tract with nausea, vomiting, pain. May have effects similar to that of acute inhalation. Chronic Potential Health Effects: Inhalation and Ingestion: Prolonged or repeated exposure via inhalation may cause central nervous system and cardiovascular symptoms similar to that of acute inhalation and ingestion as well liver damage/failure, kidney damage/failure (with hematuria, proteinuria, oliguria, renal tubular acidosis), brain damage, weight loss, blood (pigmented or nucleated red blood cells, changes in white blood cell count), bone marrow changes, electrolyte imbalances (Hypokalemia, Hypophosphatemia), severe, muscle weakness and Rhabdomyolysis. Skin: Repeated or prolonged skin contact may cause defatting dermatitis.

Section 12: Ecological Information

Ecotoxicity:

Ecotoxicity in water (LC50): 313 mg/l 48 hours [Daphnia (daphnia)]. 17 mg/l 24 hours [Fish (Blue Gill)]. 13 mg/l 96 hours [Fish (Blue Gill)]. 56 mg/l 24 hours [Fish (Fathead minnow)]. 34 mg/l 96 hours [Fish (Fathead minnow)]. 56.8 ppm any hours [Fish (Goldfish)].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

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

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification: : Toluene UNNA: 1294 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

California prop. 65: This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute: Toluene California prop. 65 (no significant risk level): Toluene: 7 mg/day (value) California prop. 65 (acceptable daily intake level): Toluene: 7 mg/day (value) California prop. 65: This product contains the following ingredients for which the State of California has found to cause birth defects which would require a warning under the statute: Toluene Connecticut hazardous material survey.: Toluene Illinois

toxic substances disclosure to employee act: Toluene Illinois chemical safety act: Toluene New York release reporting list: Toluene Rhode Island RTK hazardous substances: Toluene Pennsylvania RTK: Toluene Florida: Toluene Minnesota: Toluene Michigan critical material: Toluene Massachusetts RTK: Toluene Massachusetts spill list: Toluene New Jersey: Toluene New Jersey spill list: Toluene Louisiana spill reporting: Toluene California Director's List of Hazardous Substances.: Toluene TSCA 8(b) inventory: Toluene TSCA 8(d) H and S data reporting: Toluene: Effective date: 10/04/82; Sunset Date: 10/0/92 SARA 313 toxic chemical notification and release reporting: Toluene CERCLA: Hazardous substances.: Toluene: 1000 lbs. (453.6 kg)

Other Regulations:

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

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R11- Highly flammable. R20- Harmful by inhalation. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. S29- Do not empty into drains. S33- Take precautionary measures against static discharges.

HMS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

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Material Safety Data Sheet

Trichloroethylene, stabilized

ACC# 23850

Section 1 - Chemical Product and Company Identification

MSDS Name: Trichloroethylene, stabilized

Product Grade : SQ, ExcelaR, EL

Catalog Numbers: 28455, 28456, 28457, 14715, 41957

Synonyms: Trichloroethylene

Company Identification:

Fisher Scientific

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THERMO ELECTRON LLS INDIA PVT.LTD.

Godrej Coliseum, 101A-101B, Somaiya Hospital Road,

Off Eastern Express Highway, Sion (East), Mumbai-400 022, India

For information, call: 022 – 6680 3001/2, **Call India Toll Free** – 1800 209 7001

Emergency Number: 022-66803004/14

For CHEMTREC assistance, call: 800-424-9300 [International]

For International CHEMTREC assistance, call: 703-527-3887 [International]

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
79-01-6	Trichloroethylene	>99	201-167-4

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: clear, colorless liquid.

Warning! Breathing vapors may cause drowsiness and dizziness. Causes eye and skin irritation. Aspiration hazard if swallowed. Can enter lungs and cause damage. May cause cancer based on animal studies. May cause liver damage.

Target Organs: Central nervous system, liver, eyes, skin.

Potential Health Effects



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Eye: Causes moderate eye irritation. May result in corneal injury. Contact produces irritation, tearing, and burning pain. Contact with trichloroethylene causes pain but no permanent injury to the eyes. (Doc of TLV)

Skin: Causes mild skin irritation. Prolonged and/or repeated contact may cause defatting of the skin and dermatitis. May cause peripheral nervous system function impairment including persistent neuritis, and temporary loss of touch. Damage to the liver and other organs has been observed in workers who have been overexposed.

Ingestion: May cause irritation of the digestive tract. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal.

Inhalation: May cause respiratory tract irritation. May cause liver abnormalities. May cause cardiac abnormalities. May cause peripheral nervous system effects. Inhalation overexposure may lead to central nervous system depression, producing effects such as dizziness, headache, confusion, incoordination, nausea, weakness, and loss of consciousness. Extreme exposures may cause other CNS effects including death. The chief symptoms of TCE exposure were found to be abnormal fatigue, irritability, headache, gastric disturbances, and intolerance to alcohol. (Doc to TLV)

Chronic: Possible cancer hazard based on tests with laboratory animals. Chronic inhalation may cause effects similar to those of acute inhalation. Prolonged or repeated skin contact may cause defatting and dermatitis. May cause peripheral nervous system function impairment including persistent neuritis, and temporary loss of touch. Damage to the liver and other organs has been observed in workers who have been overexposed.

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

Skin: Get medical aid if irritation develops or persists. Flush skin with plenty of soap and water.

Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Possible aspiration hazard. Get medical aid immediately.

Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation.

Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool.



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Extinguishing Media: Use extinguishing media most appropriate for the surrounding fire.

Flash Point: None

Autoignition Temperature: 420 deg C (788.00 deg F)

Explosion Limits, Lower:8

Upper: 10.5

NFPA Rating: (estimated) Health: 2; Flammability: 1; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Provide ventilation. Approach spill from upwind. Control runoff and isolate discharged material for proper disposal.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use with adequate ventilation. Avoid contact with eyes, skin, and clothing. Avoid breathing vapor.

Storage: Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Trichloroethylene	50 ppm TWA; 100 ppm STEL	1000 ppm IDLH	100 ppm TWA; 200 ppm Ceiling

OSHA Vacated PELs: Trichloroethylene: 50 ppm TWA; 270 mg/m3 TWA



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Personal Protective Equipment

Eyes: Wear chemical splash goggles.

Skin: Wear appropriate protective gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Liquid

Appearance: clear, colorless

Odor: chloroform-like

pH: Not available.

Vapor Pressure: 58 mm Hg @ 20 deg C

Vapor Density: 4.5 (air=1)

Evaporation Rate:0.69 (CCl₄=1)

Viscosity: 0.0055 poise

Boiling Point: 87 deg C

Freezing/Melting Point:-86 deg C

Decomposition Temperature:Not available.

Solubility: Slightly soluble.

Specific Gravity/Density:1.46

Molecular Formula:C₂HCl₃

Molecular Weight:131.39

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.

Conditions to Avoid: Light, confined spaces.

Incompatibilities with Other Materials: Active metals.

Hazardous Decomposition Products: Hydrogen chloride, phosgene, carbon monoxide, carbon dioxide.

Hazardous Polymerization: May occur.

Section 11 - Toxicological Information



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Godrej Coliseum,
101 A -101 B,
Somaiya Hospital Road ,

Off Eastern Express Highway,
Sion (E), Mumbai - 400 022,
INDIA

+91-22-6680 3000 tel
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RTECS#:

CAS# 79-01-6: KX4550000

LD50/LC50:

CAS# 79-01-6:

- Draize test, rabbit, eye: 20 mg/24H Moderate;
- Draize test, rabbit, skin: 2 mg/24H Severe;
- Inhalation, mouse: LC50 = 8450 ppm/4H;
- Inhalation, mouse: LC50 = 220000 mg/m³/20M;
- Inhalation, mouse: LC50 = 262000 mg/m³/30M;
- Inhalation, mouse: LC50 = 40000 mg/m³/4H;
- Inhalation, rat: LC50 = 140700 mg/m³/1H;
- Oral, mouse: LD50 = 2402 mg/kg;
- Oral, mouse: LD50 = 2400 mg/kg;
- Oral, rat: LD50 = 4920 mg/kg;
- Skin, rabbit: LD50 = >20 gm/kg;
- Skin, rabbit: LD50 = 20 mL/kg;

Carcinogenicity:

CAS# 79-01-6:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 4/1/88
- **NTP:** Suspect carcinogen
- **IARC:** Group 2A carcinogen

Epidemiology: In six epidemiological studies completed, there was no evidence to suggest that trichloroethylene has increased the incidence of cancer in humans. (Documentation of the TLV, 7th edition)

Teratogenicity: No information available.

Reproductive Effects: Experimental reproductive effects have been observed.

Mutagenicity: Human mutation data has been reported. IARC and the National Toxicology Program (NTP) stated that variability in the mutagenicity test results with trichloroethylene may be due to the presence of various stabilizers used in TCE which are mutagens (e.g. epoxybutane, epichlorohydrin). See actual entry in RTECS for complete information. R68 Mutagen Category 3 (CHIP 2002, UK).

Neurotoxicity: No information available.

Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Fathead Minnow: 41-67 mg/L; 96 hrs.; LC50 Daphnia: Daphnia: 2.2-100 mg/L; 48 hrs.; LC50 Mollusk Shrimp: 2 mg/L; 96 hrs.; LC50 Bluegill sunfish, LD50=44,700 ug/L/96Hr. Fathead minnow, LC50=40.7 mg/L/96Hr.

Environmental: In air, substance is photooxidized and is reported to form phosgene, dichloroacetyl chloride, and formyl chloride. In water, it evaporates rapidly. Potential for



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mobility in soil is high.

Physical: No information available.

Other: Bioconcentration potential is low (BCF less than 100).

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.

RCRA P-Series: None listed.

RCRA U-Series:

CAS# 79-01-6: waste number U228.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	TRICHLOROETHYLENE	TRICHLOROETHYLENE
Hazard Class:	6.1	6.1
UN Number:	UN1710	UN1710
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA

CAS# 79-01-6 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs



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CAS# 79-01-6: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 79-01-6: immediate, delayed, reactive.

Section 313

This material contains Trichloroethylene (CAS# 79-01-6, >99%), which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

Clean Air Act:

CAS# 79-01-6 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 79-01-6 is listed as a Hazardous Substance under the CWA. CAS# 79-01-6 is listed as a Priority Pollutant under the Clean Water Act. CAS# 79-01-6 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 79-01-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

The following statement(s) is(are) made in order to comply with the California Safe Drinking Water Act:

WARNING: This product contains Trichloroethylene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 79-01-6: 50 æg/day NSRL (oral); 80 æg/day NSRL (inhalation)

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T

Risk Phrases:

R 36/38 Irritating to eyes and skin.

R 45 May cause cancer.

R 52/53 Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

R 67 Vapours may cause drowsiness and dizziness.

Safety Phrases:

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 53 Avoid exposure - obtain special instructions before use.

S 61 Avoid release to the environment. Refer to special instructions /safety data sheets.

WGK (Water Danger/Protection)

CAS# 79-01-6: 3



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Canada - DSL/NDSL

CAS# 79-01-6 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1B, D2B.

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

Canadian Ingredient Disclosure List

CAS# 79-01-6 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 2/01/1999

Revision #7 Date: 12/27/2006

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.



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MATERIAL SAFETY DATA SHEET

Section 1 - Chemical Product and Company Identification

MSDS Name: 1,2,4-Trimethylbenzene
Catalog Numbers: AC140090000, AC140090010, AC140090025, AC140095000
Synonyms: Pseudocumene.
Company Identification: Acros Organics BVBA
 Janssen Pharmaceuticaaan 3a
 2440 Geel, Belgium
Company Identification: (USA) Acros Organics
 One Reagent Lane
 Fair Lawn, NJ 07410
For information in the US, call: 800-ACROS-01
For information in Europe, call: +32 14 57 52 11
Emergency Number, Europe: +32 14 57 52 99
Emergency Number US: 201-796-7100
CHEMTREC Phone Number, US: 800-424-9300
CHEMTREC Phone Number, Europe: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#: 95-63-6
Chemical Name: 1,2,4-Trimethylbenzene
%: 98
EINECS#: 202-436-9

Hazard Symbols:



XN N



Risk Phrases:

10 20 36/37/38 51/53

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Warning! Flammable liquid and vapor. Harmful if inhaled. Causes eye, skin, and respiratory tract irritation. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. Target Organs: Blood, central nervous system, respiratory system, eyes, skin.

Potential Health Effects

Eye: Causes eye irritation. Causes redness and pain.
Skin: Causes skin irritation. Causes redness and pain. May be harmful if absorbed through the skin.
Ingestion: May cause irritation of the digestive tract. Aspiration of material into the lungs may cause chemical pneumonitis, which may be fatal. May be harmful if swallowed. May cause central nervous system depression.
Inhalation: Harmful if inhaled. Causes respiratory tract irritation. May cause drowsiness, unconsciousness, and central nervous system depression.
Chronic: Prolonged or repeated skin contact may cause dermatitis. May cause anemia and other blood cell abnormalities. Prolonged exposure may produce a narcotic effect. Prolonged or repeated exposure may cause nausea, dizziness, and headache.

Section 4 - First Aid Measures

- Eyes:** Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
- Skin:** Get medical aid. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes.
- Ingestion:** Do not induce vomiting. Possible aspiration hazard. Get medical aid immediately. Call a poison control center.
- Inhalation:** Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Possible aspiration hazard. Do not use mouth-to-mouth resuscitation if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.

Notes to Physician:

Section 5 - Fire Fighting Measures

- General Information:** As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Vapors may form an explosive mixture with air. Vapors can travel to a source of ignition and flash back. Will burn if involved in a fire. Containers may explode in the heat of a fire. Flammable liquid and vapor.
- Extinguishing Media:** Use water spray to cool fire-exposed containers. Use water spray, dry chemical, carbon dioxide, or chemical foam.
- Autoignition Temperature:** 500 deg C (932.00 deg F)
- Flash Point:** 48 deg C (118.40 deg F)
- Explosion Limits: Lower:** 0.9 vol %
- Explosion Limits: Upper:** 6.4 vol %
- NFPA Rating:** health: 2; flammability: 2; instability: 0;

Section 6 - Accidental Release Measures

- General Information:** Use proper personal protective equipment as indicated in Section 8.
- Spills/Leaks:** Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Wear a self contained breathing apparatus and appropriate personal protection. (See Exposure Controls, Personal Protection section). Remove all sources of ignition. Use a spark-proof tool. Do not let this chemical enter the environment.

Section 7 - Handling and Storage

- Handling:** Use spark-proof tools and explosion proof equipment. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Use only in a chemical fume hood. Keep away from heat, sparks and flame.
- Storage:** Keep away from sources of ignition. Store in a cool, dry place. Store in a tightly closed container. Flammables-area.

Section 8 - Exposure Controls, Personal Protection

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
1,2,4-Trimethylbenzene	25 ppm TWA (listed under Trimethyl benzene).	25 ppm TWA; 125 mg/m ³ TWA	none listed

OSHA Vacated PELs: 1,2,4-Trimethylbenzene: 25 ppm TWA; 125 mg/m³ TWA (listed under Trimethyl benzene)

Engineering Controls:

Use explosion-proof ventilation equipment. Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.

Exposure Limits

Personal Protective Equipment

- Eyes:** Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
- Skin:** Wear appropriate protective gloves to prevent skin exposure.
- Clothing:** Wear appropriate protective clothing to prevent skin exposure.
- Respirators:** A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

- Physical State:** Clear liquid
- Color:** colorless
- Odor:** aromatic odor
- pH:** Not available
- Vapor Pressure:** 7 mm Hg @ 44.4 deg C
- Vapor Density:** 4.15 (air=1)
- Evaporation Rate:** Not available
- Viscosity:** Not available
- Boiling Point:** 168 deg C @ 760 mmHg (334.40°F)
- Freezing/Melting Point:** -44 deg C (-47.20°F)
- Decomposition Temperature:** Not available
- Solubility in water:** Insoluble
- Specific Gravity/Density:** 0.880 g/cm3
- Molecular Formula:** C9H12
- Molecular Weight:** 120.19

Section 10 - Stability and Reactivity

- Chemical Stability:** Stable under normal temperatures and pressures.
- Conditions to Avoid:** Incompatible materials, ignition sources, excess heat.
- Incompatibilities with Other Materials:** Strong oxidizing agents.
- Hazardous Decomposition Products:** Carbon monoxide, carbon dioxide.
- Hazardous Polymerization:** Will not occur.

Section 11 - Toxicological Information

- RTECS#:** CAS# 95-63-6: DC3325000
- LD50/LC50:** RTECS:
CAS# 95-63-6: Inhalation, rat: LC50 = 18000 mg/m3/4H;
Oral, mouse: LD50 = 6900 mg/kg;
Oral, rat: LD50 = 5 gm/kg;
- Carcinogenicity:** 1,2,4-Trimethylbenzene - Not listed as a carcinogen by ACGIH, IARC, NTP, or CA Prop 65.
- Other:** See actual entry in RTECS for complete information.

Section 12 - Ecological Information

- Ecotoxicity:** Fish: Fathead Minnow: LC50 = 77.2 mg/L; 96 Hr; Flow-through at 25 C (pH 7.24)
- Other:** Do not empty into drains.

Section 13 - Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.

Section 14 - Transport Information

US DOT
Shipping Name: FLAMMABLE LIQUIDS, N.O.S. (1,2,4-Trimethylbenzene)
Hazard Class: 3
UN Number: UN1993
Packing Group: III
Canada TDG

Shipping Name: Not available
Hazard Class:
UN Number:
Packing Group:

Section 15 - Regulatory Information

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols: XN N

Risk Phrases:

R 10 Flammable.

R 20 Harmful by inhalation.

R 36/37/38 Irritating to eyes, respiratory system and skin.

R 51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 95-63-6: 3

Canada

CAS# 95-63-6 is listed on Canada's DSL List

Canadian WHMIS Classifications: B3, D1B, D2B

This product has been classified in accordance with the hazard criteria of the Controlled Products Regulations and the MSDS contains all of the information required by those regulations.

CAS# 95-63-6 is listed on Canada's Ingredient Disclosure List

US Federal

TSCA

CAS# 95-63-6 is listed on the TSCA
Inventory.

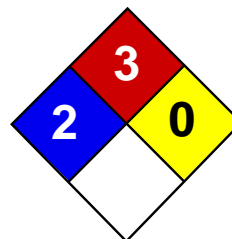
Section 16 - Other Information

MSDS Creation Date: 5/19/1999

Revision #5 Date 8/30/2007

Revisions were made in Sections: 3, 4, 5, 6, 7, 8, 9, 10, 11, 1

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall the company be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential, or exemplary damages howsoever arising, even if the company has been advised of the possibility of such damages.



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet

Xylenes MSDS

Section 1: Chemical Product and Company Identification

Product Name: Xylenes

Catalog Codes: SLX1075, SLX1129, SLX1042, SLX1096

CAS#: 1330-20-7

RTECS: ZE2100000

TSCA: TSCA 8(b) inventory: Xylenes

CI#: Not available.

Synonym: Xylenes; Dimethylbenzene; xylol; methyltoluene

Chemical Name: Xylenes (o-, m-, p- isomers)

Chemical Formula: C₆H₄(CH₃)₂

Contact Information:

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

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

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

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

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

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Xylenes	1330-20-7	100

Toxicological Data on Ingredients: Xylenes: ORAL (LD50): Acute: 4300 mg/kg [Rat]. 2119 mg/kg [Mouse]. DERMAL (LD50): Acute: >1700 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects: Hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Skin Contact:

In case of contact, immediately flush skin with plenty of water. Cover the irritated skin with an emollient. Remove contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention.

Serious Skin Contact:

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

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if symptoms appear.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek medical attention.

Ingestion:

Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 464°C (867.2°F)

Flash Points: CLOSED CUP: 24°C (75.2°F). (Tagliabue.) OPEN CUP: 37.8°C (100°F).

Flammable Limits: LOWER: 1% UPPER: 7%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances:

Highly flammable in presence of open flames and sparks, of heat. Non-flammable in presence of shocks.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available. Slightly explosive in presence of open flames and sparks, of heat.

Fire Fighting Media and Instructions:

Flammable liquid, soluble or dispersed in water. SMALL FIRE: Use DRY chemical powder. LARGE FIRE: Use alcohol foam, water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Vapors may travel to source of ignition and flash back.

Special Remarks on Explosion Hazards:

Vapors may form explosive mixtures with air. Containers may explode when heated. May polymerize explosively when heated. An attempt to chlorinate xylene with 1,3-Dichloro-5,5-dimethyl-2,4-imidazolidindione (dichlorohydrantoin) caused a violent explosion

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:

Flammable liquid. Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined

areas; dike if needed. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.

Storage:

Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

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

Personal Protection:

Splash goggles. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

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

Exposure Limits:

TWA: 100 (ppm) [Canada] TWA: 435 (mg/m³) [Canada] TWA: 434 STEL: 651 (mg/m³) from ACGIH (TLV) [United States]
TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish.

Taste: Not available.

Molecular Weight: 106.17 g/mole

Color: Colorless. Clear

pH (1% soln/water): Not available.

Boiling Point: 138.5°C (281.3°F)

Melting Point: -47.4°C (-53.3°F)

Critical Temperature: Not available.

Specific Gravity: 0.864 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.7 (Air = 1)

Volatility: Not available.

Odor Threshold: 1 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; $\log(\text{oil/water}) = 3.1$

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility:

Insoluble in cold water, hot water. Miscible with absolute alcohol, ether, and many other organic liquids.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ignition sources, incompatibles

Incompatibility with various substances: Reactive with oxidizing agents, acids.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Store away from acetic acid, nitric acid, chlorine, bromine, and fluorine.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

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

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2119 mg/kg [Mouse]. Acute dermal toxicity (LD50): >1700 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5000 4 hours [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).

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

Special Remarks on Toxicity to Animals:

Lowest Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Man] - Route: Oral; Dose: 10000 ppm/6H

Special Remarks on Chronic Effects on Humans:

Detected in maternal milk in human. Passes through the placental barrier in animal. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects (male and female fertility (spontaneous abortion and fetotoxicity)) and birth defects based animal data.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: Causes skin irritation. Can be absorbed through skin. Eyes: Causes eye irritation. Inhalation: Vapor causes respiratory tract and mucous membrane irritation. May affect central nervous system and behavior (General anesthetic/CNS depressant with effects including headache, weakness, memory loss, irritability, dizziness, giddiness, loss of coordination and judgement, respiratory depression/arrest or difficulty breathing, loss of appetite, nausea, vomiting, shivering, and possible coma and death). May also affects blood, sense organs, liver, and peripheral nerves. Ingestion: May cause gastrointestinal irritation including abdominal pain, vomiting, and nausea. May also affect liver and urinary system/kidneys. May cause effects similar to those of acute inhalation. Chronic Potential Health Effects: Chronic inhalation may affect the urinary system (kidneys) blood (anemia), bone marrow (hyperplasia of bone marrow) brain/behavior/Central Nervous system. Chronic inhalation may also cause mucosal bleeding. Chronic ingestion may affect the liver and metabolism (loss of appetite) and may affect urinary system (kidney damage)

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

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

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

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

Section 14: Transport Information

DOT Classification: CLASS 3: Flammable liquid.

Identification : Xylenes UNNA: 1307 PG: III

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut hazardous material survey.: Xylenes Illinois chemical safety act: Xylenes New York acutely hazardous substances: Xylenes Rhode Island RTK hazardous substances: Xylenes Pennsylvania RTK: Xylenes Minnesota: Xylenes Michigan critical material: Xylenes Massachusetts RTK: Xylenes Massachusetts spill list: Xylenes New Jersey: Xylenes New Jersey spill list: Xylenes Louisiana spill reporting: Xylenes California Director's List of Hazardous Substances: Xylenes TSCA 8(b) inventory: Xylenes SARA 302/304/311/312 hazardous chemicals: Xylenes SARA 313 toxic chemical notification and release reporting: Xylenes CERCLA: Hazardous substances.: Xylenes: 100 lbs. (45.36 kg)

Other Regulations:

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

Other Classifications:

WHMIS (Canada):

CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):

R10- Flammable. R21- Harmful in contact with skin. R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S36/37- Wear suitable protective clothing and gloves. S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

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

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves. Lab coat. Vapor respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 12:54 PM

Last Updated: 11/06/2008 12:00 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

Job Safety Analysis

JOB SAFETY ANALYSIS		Ctrl. No. generic	DATE: 9/14/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY Generic	WORK TYPE: Drilling	WORK ACTIVITY (Description): Soil Vapor Point Installation by Hand			
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:		POSITION / TITLE	
Jeffrey Wills	Project Hydrogeologist	Daniel Abberton		Site Health and Safety Mgr.	
Chris Migliorie	Driller (ADT)	Dennis Mayer		Operations Mgr. (ADT)	
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input checked="" type="checkbox"/> FACE SHIELD: (<u>while air knifing and jack hammering</u>) <input checked="" type="checkbox"/> HEARING PROTECTION: (<u>as needed</u>) <input checked="" type="checkbox"/> SAFETY SHOES <u>steel or composite toe</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>fluorescent long sleeve shirt or long sleeve shirt and reflective safety vest.</u>	<input checked="" type="checkbox"/> GLOVES: <u>Leather, Nitrile and Cut Resistant ANSI Level 2</u> <input checked="" type="checkbox"/> OTHER: <u>Insect Repellant, sunscreen (as needed)</u>		
REQUIRED AND / OR RECOMMENDED EQUIPMENT					
Vac-Truck or Vac Drum, Jack Hammer, Air Knife, Hand Tools, Photoionization Detector, Multi Gas Meter, 42 inch safety cones and flags, 20 lb. Fire Extinguisher, "Work Area" Signs, Chop Saw, Pressurized Water Sprayer, 6-inch stainless steel sample screens, Teflon-lined tubing.					
EXCLUSION ZONE POLICY: All non-essential personnel will maintain a 10' exclusion zone during any invasive work					
"SHOW ME YOUR HANDS"					
Driller and helper should show that hands are clear from controls and moving parts					
Assess 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS			
1. Verify pre-clearance protocol and Subsurface Clearance Procedure Checklist	1a. CONTACT: Underground utility damage; property damage; personal injury	1a. Confirm that local utility companies were contacted prior to drilling; have DigSafe number available at time of work. 1a. Walk the Site to evaluate utility markings and review maps (see Site Walk Inspection JSA). 1a. Review pre-clearing checklist form. Pre-clearing of the drilling location must be conducted to a minimum of 5 vertical feet below ground surface using hand tools and/or an air knife/vacuum, when installing soil vapor point deeper than 5 feet below ground surface (bgs).			
2. Mobilize/demobilize and establish Exclusion Zone	2a. FALL: tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the Site 2b. CONTACT: with traffic (including any unintended movement of the work truck), Contact / Interference with Other Site Activities	2a. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 2a. Do not climb over stored materials/equipment; walk around. Practice good housekeeping. 2a. Use established pathways and walk on stable, secure ground. 2b. When first arriving onsite park vehicles in designated parking space and/or out of the way locations. Use parking brake on all vehicles and tire chocks on work trucks and trailers. 2b. Check in with Site Manager/Supervisor to ensure coordination with other site activities. 2b. Identify potential traffic sources. 2b. Wear required PPE including high visibility clothing or reflective vest. 2b. Maintain 10 foot exclusion zone for workers, non-essential personnel and pedestrians. 2b. Use a spotter while moving work vehicles and for all backing operations; plan ahead to avoid backing when unnecessary. 2b. Set-up the work area / position equipment in a manner that eliminates or reduces the need for backing of trucks and trailers. 2b. Delineate work area with cones, flags, caution tape, and/or other barriers. Position "Work Area" signs at site entrances. 2b. Position largest vehicle to protect against oncoming traffic where applicable. 2b. Face traffic, maintain eye contact with oncoming vehicles, use a spotter, and establish a safe exit route. 2b. Chock wheels of work truck and other support equipment on wheels and engage parking brake if possible.			
Assess 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS			
	2c. EXERTION: during moving of equipment (cones and signage) into work area	2c. Keep back straight, lift with legs, keep load close to body, and never reach with a load. 2c. Ensure that loads are balanced to reduce the potential for muscle strain.			

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	<p>2d. EXPOSURE: To biological hazards: ticks, bees/wasps, poison ivy, insects, etc. (ticks are most active any time the temperature is above freezing from March to November)</p> <p>2e. EXPOSURE: Sun possibly causing sunburn or cold possibly causing cold stress</p> <p>2f. EXPOSURE: Noise hazards (certain sites operate heavy machinery)</p>	<p>2d. Inspect area to avoid contact with biological hazards. 2d. Wear long sleeved clothing (mandatory PPE) to protect skin and apply insect repellent containing DEET when working in overgrown areas of the Site. 2d. Personnel shall examine themselves for ticks. 2d. If skin comes in contact with poison ivy, wash skin thoroughly with soap and water as soon as possible.</p> <p>2e. Wear sunscreen with an SPF of at least 15 whenever 30 minutes or more of exposure is expected. 2e. Wear weather appropriate attire 2e. Take frequent heat breaks to avoid cold stress. 2e. Drink fluids to remain hydrated.</p> <p>2f. Wear hearing protection if necessary. 2f. When possible, position body away from noise origins to reduce exposure.</p>
3. Concrete saw cutting, jack hammer and hand clearance (air knife) (review completed Subsurface Clearance Form; Review Geophysical Survey notes)	3a. See Clearing, Vactron and Air Knife JSAs	3a. See Clearing, Vactron and Air Knife JSA.
4. Soil vapor point installation	<p>4a. CAUGHT: Pinch points associated with equipment and installation</p> <p>4b. EXERTION: Muscle strain</p>	<p>4a. Always wear leather gloves when making connections and installing sample screen/tubing; wear cut-proof (i.e., Kevlar) gloves when handling cutting tools (no fix blade knives). 4a. Inspect the equipment prior to use for potential pinch points. 4a. Inspect all hand tools for damage and wear prior to use. Remove any damaged tool from service and replace.</p> <p>4b. See 2c.</p>
5. Move drum to staging area using drum cart	<p>5a. EXPOSURE/CONTACT: Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, soil)</p> <p>5b. EXERTION: Muscle strain</p> <p>5c. CAUGHT: Pinch points associated with handling drum lid</p> <p>5d. FALL: Slipping on spilled materials</p>	<p>5a. Do not overfill drums. Wear Nitrile gloves and long sleeved shirts to avoid contact with skin. 5a. Dispose of used impacted materials/PPE in designated containers.</p> <p>5b. See 2c.</p> <p>5c. Ensure that fingers are not placed under the lid of the drum. Wear leather or cut-proof gloves while sealing drum lid.</p> <p>5d. Clean up any spills using absorbent pads.</p>
6. Decontaminate equipment	<p>6a. EXPOSURE/CONTACT: Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors)</p> <p>6b. EXPOSURE: Chemicals in cleaning solution including ammonia</p>	<p>6a. Wear chemical-resistant disposable gloves and safety glasses. 6a. See 5a.</p> <p>6b. See 5a. 6b. See 2a.</p>

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JOB SAFETY ANALYSIS		Ctrl. No. GEN-004	DATE 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: Generic	WORK TYPE: Drilling	WORK ACTIVITY (Description): Direct Push Soil Borings / Well Installation			
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE		
Jeffrey Wills	Project Hydrogeologist	Ray Fitzpatrick	OHSO		
Thalassa Sodre	Staff Assistant Engineer				
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION: (as needed) <input checked="" type="checkbox"/> SAFETY SHOES: <u>Composite-toe or steel toe boots</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest or high visibility clothing, Long Sleeve Shirt</u>	<input checked="" type="checkbox"/> GLOVES: <u>Leather, Nitrile and cut resistant</u> <input checked="" type="checkbox"/> OTHER: <u>Insect Repellent, sunscreen (as needed)</u>		
REQUIRED AND / OR RECOMMENDED EQUIPMENT					
Geoprobe or Truck-Mounted Direct Push Drill Rig, Hand Tools, Photoionization Detector and/or Multi-Gas Meter (or equivalent), Macrocore liners, Liner Opening Tool, 42" Cones & Flags					
Exclusion Zone Policy – All non-essential personnel will maintain a distance of 10' feet from drilling equipment while moving/engaged.					
“SHOW ME YOUR HANDS” Driller and helper should show that hands are clear from controls and moving parts					
Assess 1¹JOB STEPS	Analyze 2²POTENTIAL HAZARDS	Act 3³CRITICAL ACTIONS			
1. Mobilization of drilling rig (ensure the Subsurface Clearance Protocol and Drill Rig Checklist are completed)	1a. CONTACT: Equipment/property damage. 1b. FALL: Slip/trip/fall hazards.	1a. The drill rig's tower/derrick will be lowered and secured prior to mobilization. 1a. A spotter should be utilized while moving the drill rig. If personnel move into the path of the drill rig, the drill rig will be stopped until the path is again clear. Use a spotter for all required backing operations. 1a. Set-up the work area and position equipment in a manner that eliminates or reduces the need for backing of support trucks and trailers. 1a. When backing up truck rig with an attached trailer use a second spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. 1a. Inspect the driving path for uneven terrain. Level or avoid if needed. 1a. Drill rig should have a minimum exclusion zone of 10 feet for non-essential personnel (i.e., driller helper, geologist) when the rig is moving/ in operation. 1b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. Do not climb over stored materials/equipment; walk around. Practice good housekeeping. 1b. Use established pathways and walk on stable, secure ground.			
2. Raising tower/derrick of drill rig	2a. CONTACT: Overhead hazards. 2b. CONTACT: Pinch Points when raising the rig and instability of rig	2a. Prior to raising the tower/derrick, the area above the drilling rig will be inspected for wires, tree limbs, piping, or other structures, that could come in contact with the rig's tower and/or drilling rods or tools. 2a. Maintain a safe distance from overhead structures. 2b. Inspect the equipment prior to use and avoid pinch points. 2b. Lower out riggers on rig to ensure stability prior to raising rig tower/derrick. 2b. If the rig needs to be mounted, be sure to use three points of contact.			
3. Advancement of drilling equipment and well installation	3a. CONTACT: Flying debris	3a. Be aware of and avoid potential lines of fire and wear required PPE such as eye, ear, and hand protection.			

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<p>3. Advancement of drilling equipment and well installation (Continued)</p>	<p>3b. EXPOSURE: Noise and dust.</p> <p>3c. CAUGHT: Limb/extremity pinching; abrasion/crushing.</p> <p>3d. CONTACT: Equipment imbalance during advancement of drill equipment.</p> <p>3e. EXPOSURE: Inhalation of contamination/vapors.</p> <p>3f. FALL: Slip/trip/fall hazards.</p> <p>3g. EXERTION: Potential for muscle strain/injury while lifting and installing well casings, lifting sand bags, and/or lifting rods.</p>	<p>3b. Wet borehole area with sprayer to minimize dust. 3b. Stand upwind and keep body away from rig. 3b. Dust mask should be worn if conditions warrant. 3b. Wear hearing protection when the drill rig is in operation.</p> <p>3c. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools. 3c. Inspect the equipment prior to use for potential pinch points. Keep hands away from being between pinch points and use of tools is preferable compared to fingers and hands. 3c. Inspect drill head for worn surface or missing teeth; replace if damaged or blunt. 3c. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body. 3c. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment. 3c. Drillers and helpers will understand and use the "Show Me Your Hands" Policy. 3c. Spinning rods/casing have an exclusion zone of 10 feet while in operation.</p> <p>3d. Drillers will advance the borehole with caution to avoid causing the rig to become imbalanced and/or tip. 3d. The blocking and leveling devices used to secure the rig will be inspected by drillers and Roux personnel regularly to see if shifting has occurred. 3d. In addition, personnel and equipment that are non-essential to the advancement of the borehole will be positioned away from the rig at a distance that is at least as far as the boom is high (minimum exclusion zone of 10 feet).</p> <p>3e. Air monitoring using a calibrated photoionization detector (PID) will be used to periodically to monitor the breathing zone of the work area. 3e. If a reading of >5ppm is recorded, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux PM of the condition. The Roux PM will then recommend additional precautions in accordance with the site specific health and safety plan.</p> <p>3f. Contain drill cuttings and drilling water to prevent fall hazards from developing in work area. 3f. See 1b.</p> <p>3g. Keep back straight and bend at the knees. 3g. Utilize team lifting for objects over 50lbs. 3g. Use mechanical lifting device for odd shaped objects.</p>
<p>4. Decontaminate equipment.</p>	<p>4a. EXPOSURE/CONTACT: To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).</p> <p>4b. EXPOSURE: To chemicals in cleaning solution including ammonia.</p>	<p>4a. Wear chemical-resistant disposable gloves and safety glasses. 4a. Contain decontamination water so that it does not spill. 4a. Use an absorbent pad to clean spills, if necessary. 4a. See 3b.</p> <p>4b. See 4a. Review MSDS to ensure appropriate precautions are taken and understood.</p>

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JOB SAFETY ANALYSIS		Ctrl. No. GEN-007	DATE: 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 1
JSA TYPE CATEGORY GENERIC		WORK TYPE Drilling	WORK ACTIVITY (Description) Movement of 55-gallon Drums/Drum Handling		
DEVELOPMENT TEAM		POSITION / TITLE	REVIEWED BY:	POSITION / TITLE	
Thalassa Sodre		Staff Assistant Engineer	Jeff Wills	Project Manager	
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES		<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel toed boots</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest or high visibility clothing</u>	<input checked="" type="checkbox"/> GLOVES: <u>Cut-resistant gloves</u> <input type="checkbox"/> OTHER:	
REQUIRED AND / OR RECOMMENDED EQUIPMENT					
Required Equipment: Drum Cart and/or forklift, safety cones, and caution tape					
EXCLUSION ZONE: A 10' exclusion zone will be maintained around forklift.					
Assess 1JOB STEPS		Analyze 2POTENTIAL HAZARDS		Act 3CRITICAL ACTIONS	
1. Secure Work Area, Inspect 55-gal drums for proper condition, labeling, check drum ring and bolts.		1a. FALL: Tripping/falling due to uneven surface terrain. 1b. EXPOSURE: Drums could potentially be damaged and contain hazardous material. 1c. OVEREXERTION: Potential muscle strain while loosening or tightening bolts.		1a. Inspect walking path for uneven terrain, weather-related hazards (i.e., tree debris, puddles, etc.), and obstructions prior to accessing work area. 1a. Use established pathways and walk on stable, secure ground. 1a. Secure work area and coordinate and communicate the planned work activities with other personnel working in the area. 1a. 1b. When inspecting drums, don nitrile gloves under cut resistant glove. If drum is not properly labeled, do not open and cease all drum transport related activities. Immediately contact project manager and inform him/her of drum situation. 1b. Do not continue drum transport activities until further actions are determined by the project manager. 1b. If the drum is properly labeled, but leaking, improperly sealed, or in poor condition, place drum in an over-pack drum. 1c. Keep back straight and secure grip on drum ratchet.	
2. When using a forklift, position drum clamp in between drum ribs. When using a drum dolly, secure fastening hook on top of drum. .		2a. CAUGHT/CONTACT: Hazards between drum/forklift clamp or dolly fastener/drum. 2b. OVEREXERTION/CONTACT: Hazards associated with balancing drum on drum cart (leaning back and pulling drum with your back).		2a. Position drum clamp between the ribs on the drum to prevent possible slipping. Do not place hands between drum clamp and drum; wear cut resistant gloves. 2b. Do not jerk body. Wear cut-resistant gloves and steel toed boots. 2b. Ensure that drums are not over-filled.	
3. Transport drums to designated location and disengage drum clamp.		3a. EXPOSURE/ CONTACT: Hazards associated with drum transport; skin contact and vapors. 3b. CAUGHT: Pinching hazards associated with maneuvering drums. 3c. FALL: Tripping/ falling due to obstructions and uneven terrain.		3a. Maintain a 10' EZ around forklift. Ensure drum clamp is secure on drum before beginning to move. 3a. Ensure that drum is sealed and lid is tight before beginning to move. 3b. Do not place fingers between drum clamp and drum; wear cut resistant gloves. 3c. See 2b. 3c. If path is too rough for drum cart, utilize forklift. 3c. Utilize a spotter while operating the forklift.	

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JSA TYPE CATEGORY Generic		Ctrl. No. GEN-006	DATE 1/15/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
WORK TYPE Surveying		WORK ACTIVITY (Description) Elevation Surveying			
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:		POSITION / TITLE	
Bjorn Wespestad	Project Engineer	Jeff Wills		Project Manager	
Thalassa Sodre	Staff Assistant Engineer				
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel-toe boots</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest or high visibility clothing</u>	<input checked="" type="checkbox"/> GLOVES: <u>Cut-resistant or leather</u> <input type="checkbox"/> OTHER		
REQUIRED AND / OR RECOMMENDED EQUIPMENT					
Surveying equipment (i.e., leveling rod/measuring ruler, tripod and scope).					
Assess 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS			
1. Locate surveying position for instrument and rod and set-up work area	1a. FALL: Slip/trip hazards. 1b. CONTACT: Traffic (surveying locations could potentially be located in parking areas and sidewalks). 1c. OVEREXERTION: Hazard due to carrying, lifting, and bending while transporting equipment. 1d. CAUGHT/CONTACT: Pinch Points / sharp edges associated with setting up the tripod.	1a. Inspect area for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to setting up at the survey location. 1b. Be aware of oncoming traffic. Utilize a flagman / spotter for locations in streets or high-traffic areas. 1b. Place 42 inch cones around the work area, and delineate work zone with caution tape, if necessary. 1b. Wear appropriate PPE including high visibility clothing or reflective safety vest. 1b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route. 1c. Use proper body positioning and lifting techniques; keep back straight, lift with legs, keep load close to body, and never reach with a load. 1c. Avoid carrying too much equipment at one time and team-lift equipment that is more than 50lb. 1d. Wear cut resistant gloves when handling the tripod. Don't carry tripod by the pointed ends.			
2. Open / close manhole cover to well that is being surveyed (if necessary).	2a. OVEREXERTION: Muscle strain 2b. CAUGHT: Pinch points associated with removing / replacing manholes and working with hand tools. 2c. EXPOSURE: To potentially hazardous vapors. 2d. CONTACT: With traffic.	2a. See 1c. Bend knees when reaching to open well. Use manhole lifting hook or pry bar to avoid bending. 2b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools. 2b. Use proper tools (ratchet and crowbar or pry bar for well cover) and inspect before use. 2b. Do not put fingers under well cover. 2c. No open flames/heat sources. 2c. To minimize exposure to vapors allow well to vent after opening it and before survey activities begin. 2c. Work on the upwind side of well. 2d. See 1b.			

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Assess ¹ JOB STEPS	Analyze ² POTENTIAL HAZARDS	Act ³ CRITICAL ACTIONS
3. Perform survey.	3a. FALL: Slip/trip hazards 3b. CONTACT: Traffic (surveying locations could be potentially located in parking areas and sidewalks)	3a. See 1a. 3b. See 1b. 3b. Personnel using the scope will be devoting most of their attention to the surveying activity. Personnel holding the measuring stick should be extra vigilant of survey personnel and communicate any potential hazards to the instrument person via handheld radio or similar means. Ensure reflective safety vest is worn.
4. Break down work area.	4a. CONTACT: Traffic (surveying locations can potentially be located in parking areas and sidewalks). 4b. EXERTION: Hazard due to carrying, lifting, and bending while transporting equipment	4a. See 1b. 4b. See 1c.

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JOB SAFETY ANALYSIS Ctrl. No. GEN-005		DATE 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY Generic	WORK TYPE: Gauging and Sampling	WORK ACTIVITY (Description): Gauging and Sampling		
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE	
Gina Masciello	Project Scientist	Jeff Wills	Project Manager	
Thalassa Sodre	Staff Assistant Engineer			
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT				
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input type="checkbox"/> HEARING PROTECTION <input checked="" type="checkbox"/> SAFETY SHOES: <u>Composite-toe or steel toe boots</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest or high visibility clothing</u>	<input checked="" type="checkbox"/> GLOVES: <u>Leather, Nitrile and cut resistant</u> <input checked="" type="checkbox"/> OTHER: <u>Knee pads, Insect Repellant, sunscreen (as needed)</u>	
REQUIRED AND / OR RECOMMENDED EQUIPMENT				
42 inch Safety Cones, Caution Tape, Interface Probe and/or Water Level Meter, 20 lb. Fire Extinguisher, Buckets. Tools as needed: Socket Wrench, Screw Driver, Crow Bar, Mallet, and Wire Brush.				
Assess 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS		
1. Mobilization to monitoring well(s).	1a. FALL: Personal injury from slip/trip/fall due to uneven terrain and/or obstructions. 1b. CONTACT: With traffic/third parties. 1c. EXPOSURE: To biological hazards.	1a. Inspect pathway and plan for most suitable designated pathway prior to mobilization. 1a. Use established pathways, walk and/or drive on stable, secure, ground and avoid steep hills or uneven terrain. 1b. Identify potential traffic sources and delineate work area with 42 inch traffic safety cones. Position vehicle to protect against oncoming traffic. Use caution tape to provide a more visible delineation of the work area if necessary. 1b. Wear appropriate PPE including high visibility clothing or reflective vest. 1b. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route. 1c. Inspect work area for bees and insects. 1c. Use insect/tick repellent as necessary.		
2. Open/close well.	2a. OVEREXERTION: Muscle strain. 2b. CAUGHT: Pinch points associated with removing/replacing manholes and working with hand tools. 2c. EXPOSURE: To potential hazardous vapors.	2a. Use proper lifting techniques; keep back straight, lift with legs and bend knees when reaching to open/close well. 2b. Wear leather gloves or cut resistant gloves when working with well cover and hand tools. 2b. Use proper tools (ratchet and pry bar for well cover) and inspect before use. 2b. Do not put fingers under well cover. 2c. No open flames/heat sources. 2c. To minimize exposure to vapors allow well to vent after opening it and before sampling activities begin. 2c. Stand up-wind, if possible, to avoid vapors.		
3. Gauge well.	3a. CONTACT: With contamination (e.g. contaminated groundwater). 3b. CONTACT: With traffic.	3a. Wear chemical-resistant disposable gloves and safety glasses when gauging well. 3a. Insert and remove probe slowly to avoid splashing. 3a. Use an absorbent pad to clean probe. 3b. See 1b.		
4. Purge and sample well.	4a. EXPOSURE/CONTACT: To contamination (e.g., SPH, contaminated groundwater, vapors) and/or sample preservatives.	4a. Open and fill sample jars slowly to avoid splashing and contact with preservatives. 4a. Wear cut-resistant gloves and chemical-resistant disposable gloves when sampling. 4a. Fill sample containers over purge container to avoid spilling water onto the ground. 4a. Use an absorbent pad to clean spills.		
Assess 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS		

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Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

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<p>4. Purge and sample well (Continued).</p>	<p>4b. CONTACT: Personal injury from cuts, abrasions, or punctures by glassware or sharp objects.</p> <p>4c. EXERTION: Muscle strain while carrying equipment.</p> <p>4d. CONTACT: With traffic.</p>	<p>4b. To avoid spills or breakage, place sample ware on even surface. 4b. Do not over tighten caps on glass sample ware. 4b. Wear cut-resistant (i.e., Kevlar) gloves and chemical-resistant disposable gloves when sampling and handling glassware (i.e., VOA vials) or when using cutting tools.</p> <p>4c. Use proper lifting techniques when handling/moving equipment; bend knees and keep back straight. 4c. Use mechanical assistance or team lifting techniques when equipment is 50lbs or heavier. 4c. Make multiple trips to carry equipment.</p> <p>4d. See 1b.</p>
<p>5. Management of purge water.</p>	<p>5a. EXPOSURE/CONTACT: To contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>5b. EXERTION: Muscle strain from lifting/carrying and moving containers.</p>	<p>5a. Do not overfill container and pour liquids in such a manner that they do not splash. 5a. Properly dispose of used materials/PPE in appropriate container in designated storage area.</p> <p>5b. Use proper lifting techniques when lifting / carrying or moving container(s) (see 4c.). 5b. Do not overfill container(s).</p>
<p>6. Decontaminate equipment.</p>	<p>6a. EXPOSURE/CONTACT: To contamination (e.g., SPH, contaminated groundwater, vapors).</p>	<p>6a. Work on the upwind side, where possible, of decon area. 6a. Wear chemical-resistant disposable gloves and safety glasses. 6a. Use an absorbent pad to clean spills.</p>

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JOB SAFETY ANALYSIS		Ctrl. No.	DATE 1/12/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: Site Specific Site: Morton Village		WORK TYPE: Drilling	WORK ACTIVITY (Description): Hollow Stem Auger Soil Borings /Well Installation		
DEVELOPMENT TEAM		POSITION / TITLE	REVIEWED BY:		POSITION / TITLE
Dennis Mayer		Operations Manager	Jeff Wills		Project Manager
Gina Vanderlin		Project Scientist			
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION: (as needed) <input checked="" type="checkbox"/> SAFETY SHOES <u>steel or composite toe</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>fluorescent long sleeve shirt or long sleeve shirt and reflective safety vest.</u>	<input checked="" type="checkbox"/> GLOVES: <u>Leather, Nitrile and cut resistant</u> <input checked="" type="checkbox"/> OTHER: <u>Insect Repellent, sunscreen (as needed)</u>		
REQUIRED AND / OR RECOMMENDED EQUIPMENT					
Truck-Mounted Drilling Rig or Track Rig, Saw, Hand Tools, Photoionization Detector, Multi-Gas Meter (or equivalent), Interface Probe, 20 lb. Fire Extinguisher, 42" Cones & Flags, "Work Area" Signs					
EXCLUSION ZONE POLICY – All non-essential personnel shall maintain a 20 foot exclusion zone while drill rig is engaged					
"SHOW ME YOUR HANDS"					
Driller and helper should show that hands are clear from controls and moving parts					
Assess 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS			
1. Mobilization / demobilization and establish a work area	1a. See Mobilization/ Demobilization	1a. See Mobilization/ Demobilization JSA			
2. Raising tower/derrick of drilling rig	2a. CONTACT: Overhead hazards. 2b. CONTACT: Amputation/crush points when raising the rig and instability of rig.	2a. Prior to raising the tower/derrick, area above the drilling rig will be inspected for overhead hazards (wires, tree limbs, piping, or other structures) they may be contacted by the rig's tower or drilling rods. 2a. ExxonMobil requirements for raising a tower/derrick in the area of overhead wires must be reviewed prior to drilling. 2a. The tower/derrick must not be raised beneath overhead power lines unless approved by both the Roux PM. 2a. Maintain at a minimum 10' from from overhead structures. 2a. Do not move the rig while the tower/derrick is raised. 2b. Inspect the equipment prior to use and avoid amputation points. 2b. Lower out riggers on rig to ensure stability prior to raising rig tower derrick. Keep feet and body out of the line of fire when lowering out-riggers 2b. If the rig needs to be mounted, be sure to use three points of contact.			
3. Advancement of augers for soil borings, steel casing modification, and well material installation.	3a. CONTACT: Flying / spraying debris. 3b. EXPOSURE: Noise and dust.	3a. Wear required PPE (especially hand, eye, ear protection). 3a. Maintain minimum 20' EZ distance when operating to avoid lines of fire of possible flying materials 3b. Wet borehole area with sprayer to minimize dust. Stand upwind and keep body away from rig. 3b. Wear hearing protection while drill rig is operating/or the noise levels exceed 85dBA.			

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<p>4. Advancement of augers for soil borings, steel casing modification, and well material installation (Continued).</p>	<p>4c. CAUGHT: Limb/extremity amputation; abrasion/crushing.</p> <p>4d. CONTACT: Equipment imbalance during advancement of drill equipment, sparks/heat generated during steel casing modification with chop saw, and installing steel override casing.</p> <p>4e. EXPOSURE: Inhalation of contamination/vapors.</p> <p>4f. FALL: Slip/trip/fall hazards.</p> <p>4g. EXERTION: Installing well casings and lifting augers.</p>	<p>4c. Always wear leather gloves when making connections and using hand tools; wear cut-resistant (i.e., Kevlar) gloves when handling cutting tools.</p> <p>4c. Inspect the equipment prior to use for potential pinch points.</p> <p>4c. Test all emergency shutdown devices prior to drilling.</p> <p>4c. Inspect drill head for worn surface or missing teeth; replace if damaged or blunt.</p> <p>4c. Inspect augers, do not use if auger flight if damaged or bent.</p> <p>4c. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body.</p> <p>4c. All non-essential personnel should stay away from the immediate work area; position body out of the line-of-fire of equipment particularly when installing auger flights and steel override casings.</p> <p>4c. Drillers and helpers will understand and use the "Show Me Your Hands" Policy.</p> <p>4c. Spinning augers should have an exclusion zone of 20 feet when in operation.</p> <p>4d. Drillers will advance the borehole with caution to avoid causing the rig to become imbalanced and/or tip.</p> <p>4d. The blocking and leveling devices used to secure the rig will be inspected by drillers and Roux personnel regularly to see if shifting has occurred.</p> <p>4d. In addition, personnel and equipment that are non-essential to the advancement of the borehole will be positioned away from the rig at a distance that is at least as far as the boom is high (minimum exclusion zone of 20 feet).</p> <p>4d. When lifting and lowering steel override casing into borehole, personnel that are non-essential will be positioned away from direct line of fire incase casing falls over or swings during advancement.</p> <p>4d. Flame retardant clothing must be worn while sparks are generated.</p> <p>4e. Air monitoring using a calibrated photoionization detector (PID) will be used to periodically monitor the breathing zone of the work area.</p> <p>4e. The Action Level for breathing zone air is five parts per million (sustained) as detected by the PID.</p> <p>4e. If a reading of >5ppm is recorded, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux PM of the condition. The Roux PM will then recommend additional appropriate precautions in accordance with the site specific health and safety plan.</p> <p>4f. See 1b.</p> <p>4f. Remove soil cuttings to avoid a tripping hazard from developing near augers.</p> <p>4g. Keep back straight and bend at the knees.</p> <p>4g. Utilize team lifting for objects over 50lbs.</p> <p>4g. Use mechanical lifting device for odd shaped objects.</p>
<p>5. Cleaning the auger flights</p>	<p>5a. CONTACT: Cuts/scrapes or puncture wound from hand tool contacting auger.</p>	<p>5a. Follow "No Hands" Procedure and make sure auger is out of gear before contacting auger with tool or hand.</p> <p>5a. Pull cleaning tool across your body with handle away from body; do not push toward the auger.</p> <p>5a. Do not clean more than ¼ turn around the auger at a time.</p> <p>5a. Wear cut resistant and leather gloves.</p> <p>5a. Always use two hands to operate cleaning tool.</p> <p>5a. Inspect tool before use and remove from service if handle or metal are cracked/fatigued.</p> <p>5a. Stand out of the line of fire.</p>
<p>6. Decontaminate equipment.</p>	<p>6a. EXPOSURE/CONTACT: To contamination (e.g., contaminated groundwater, vapors).</p> <p>6b. EXPOSURE: To chemicals in cleaning solution including ammonia</p>	<p>5a. Wear chemical-resistant disposable gloves and safety glasses.</p> <p>5a. Contain decontamination water so that it does not spill.</p> <p>5a. Use an absorbent pad to clean spills, if necessary.</p> <p>5b. See 5a.</p>

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JOB SAFETY ANALYSIS		Cntrl. No. GEN-010	DATE: 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY GENERIC		WORK TYPE Site Recon	WORK ACTIVITY (Description) Mobilization/Demobilization		
DEVELOPMENT TEAM		POSITION / TITLE	REVIEWED BY:	POSITION / TITLE	
Jared Lefkowitz		Staff Assistant Scientist	Ray Fitzpatrick	OSHO	
Jeff Wills		Project Hydrogeologist			
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES		<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION (as needed) <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel Toe or composite toe</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest of high-visibility clothing;</u> <u>long sleeve shirt; long pants</u>	<input type="checkbox"/> GLOVES: <u>Leather, nitrile, and cut resistant (as needed)</u> <input type="checkbox"/> OTHER	
REQUIRED AND / OR RECOMMENDED EQUIPMENT					
Required Equipment:					
EXCLUSION ZONE: A minimum exclusion zone of 10' will be maintained around moving equipment (if necessary)					
Assess JOB STEPS	Analyze POTENTIAL HAZARDS	Act CRITICAL ACTIONS			
1. Mobilize/demobilize and establish work area	<p>1a. FALL: Slip/trips/falls from obstructions, uneven terrain, weather conditions, heavy loads, and/or poor housekeeping.</p> <p>1b. CONTACT: Personal injury and/or property damage caused by being struck by Site traffic or equipment used in Site activities.</p> <p>1c. CAUGHT: Personal injury from pinch points and being in line-of-fire of vehicle and/or equipment.</p>	<p>1a. Use 3 points-of-contact/ensure secure footing when entering and exiting vehicle.</p> <p>1a. Inspect walking path for uneven terrain, steep hills, obstructions, and/or weather-related hazards (i.e., ice, snow, and puddles) prior to mobilizing equipment. Use established pathways. Walk on stable/secure ground.</p> <p>1a. Do not climb over stored materials/equipment; walk around. Practice good housekeeping.</p> <p>1a. Wear boots with adequate treads.</p> <p>1a. Delineate unsafe areas with 42" cones, caution tape and/or flagging.</p> <p>1b. Observe and maintain the posted speed limits.</p> <p>1b. When first arriving onsite, park vehicles in designated parking space and/or out of the way locations. Use parking brake on all vehicles and tire chocks on work trucks and trailers.</p> <p>1b. Check in with Site Manager/Supervisor to ensure coordination with other Site activities.</p> <p>1b. Identify potential traffic sources.</p> <p>1b. Wear PPE including high visibility clothing or reflective vest.</p> <p>1b. Use a spotter while moving work vehicles; plan ahead to avoid backing when unnecessary.</p> <p>1b. Maintain a minimum 10' exclusion zone when vehicles are in motion. When backing up truck rig with an attached trailer use a second spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility.</p> <p>1b. Delineate work area with 42" cones, flags, caution tape, and/or other barriers.</p> <p>1b. Position "Work Area" signs at Site entrances, if possible, or at either side of work area.</p> <p>1b. Position largest vehicle to protect against oncoming traffic.</p> <p>1b. Face traffic, maintain eye contact with oncoming vehicles, use a spotter, and establish a safe exit route.</p> <p>1c. Make sure driver has engaged parking brake and placed wheel chocks in a position to prevent movement. Be sure that vehicle is parked in front/down gradient of work area.</p> <p>1c. Wear leather gloves when handling any tools or equipment. Avoid wearing loose clothing. Wear cut-resistant gloves (Kevlar or similar) when handling sharp objects/cutting tools.</p> <p>1c. Keep body parts away from line-of-fire of equipment.</p> <p>1c. Always carry tools by the handles and/or designated carrier. Ensure sharp-edged tools are sheathed/secure.</p> <p>1c. Remove any loose jewelry. Ensure loose clothing is secure.</p>			

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Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

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Assess 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS
	<p>1d. OVEREXERTION: Muscle strains while lifting/carrying equipment.</p> <p>1e. EXPOSURE: Personal injury from exposure to biological and environmental hazards.</p> <p>1f. EXPOSURE: Heat and cold related injuries.</p> <p>1g. EXPOSURE: Personal injury from noise hazards.</p>	<p>1d. Use body positioning and lifting techniques that avoid muscle strain; keep back straight, lift with legs, keep load close to body, and never reach with a load.</p> <p>1d. Ensure that loads are balanced. Use assistance (mechanical or additional person) to carry equipment that is either awkward to carry or over 50 lbs.</p> <p>1e. Inspect area to avoid contact with biological hazards (i.e. poisonous plants, stinging insects, ticks, etc.).</p> <p>1e. Wear long sleeved clothes, apply insect repellent containing DEET, and inspect clothes and skin for ticks during and after work.</p> <p>1e. Apply sunscreen (SPF 15+) if exposure to sun for 30 minutes or more is expected.</p> <p>1f. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). Take breaks as needed.</p> <p>1f. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). Take breaks as needed.</p> <p>1f. Wear clothing appropriate for weather and temperature conditions (e.g., rain jackets, snow pants, multiple layers).</p> <p>1f. If lightning is observed, wait 30 minutes in a sheltered location (car is acceptable) before resuming work.</p> <p>1g. Wear hearing protection if sound levels exceed 85 dBA.</p>

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JOB SAFETY ANALYSIS		Cntrl. No. GEN-009	DATE: 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY GENERIC		WORK TYPE Hand Tools	WORK ACTIVITY (Description) Pre-Clearing activities, including Air Knifing and Soil Vacuuming		
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE		
Jeff Wills	Project Hydrogeologist	Ray Fitzpatrick	OHSO		
Dennis Mayer	Manager (ADT)				
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input checked="" type="checkbox"/> FACE SHIELD (while air knifing) <input checked="" type="checkbox"/> HEARING PROTECTION (as needed) <input checked="" type="checkbox"/> SAFETY SHOES: <u>Steel or composite toed</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest or high visibility clothing</u>	<input checked="" type="checkbox"/> GLOVES: <u>Nitrile and cut resistant</u> <input checked="" type="checkbox"/> OTHER: <u>Dust mask (as needed)</u>		
REQUIRED AND / OR RECOMMENDED EQUIPMENT					
Required Equipment: Air Knife, Vactor Truck (Vac Truck), Compressor, Hand Tools, Photoionization Detector, Multi-Gas Meter, Traffic Cones, 20 lb. Fire Extinguisher, "Work Area" and/or "Exclusion Zone" Signs					
EXCLUSION ZONE: A 10 foot exclusion zone will be maintained around air knife and/or soil vacuum operations.					
Assess 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS			
1. Verify pre-clearance protocol.	1a. CONTACT: Underground utility damage; property damage; personal injury. See Site Walk Inspection JSA for potential hazards.	1a. Confirm that local utility companies were contacted prior to drilling. 1a. Walk the Site to evaluate utility markings and review maps (See Site Walk Inspection JSA for critical actions). 1a. Review pre-clearing checklist form and sub-surface clearance form. Pre-clearing protocol indicates that clearance must be conducted to a minimum of 5 vertical feet below ground surface or 8 vertical feet below ground surface in the critical zone using hand tools.			
2. Mobilize/demobilize and establish work area.	2a. See Mobilization / Demobilization JSA for potential hazards.	2a. See Mobilization / Demobilization JSA for critical actions.			
3. Pre-clear with air knife and soil vacuum, and/or clearance with hand tools	3a. CONTACT: Flying debris. 3b. EXPOSURE/ENERGY SOURCE: Inhalation/exposure to hazardous vapors; inhalation/exposure to dust; electrocution. 3c. CONTACT: Damage to unknown/known utility with air knife. 3d. OVEREXERTION: Poor body positioning when handling equipment and materials.	3a. Maintain 10 foot exclusion zone. Only (air knife/vac truck) operator and designated helper shall remain within exclusion zone while air knife/vac truck is active. Use the required PPE, including (at a minimum), cut resistant gloves, safety glasses with side shields, and long sleeved shirt. 3a. Wear a face shield to protect face from flying debris when using air knife. 3a. Aim air knife tip away from self and others, so to avoid line-of-fire hazards. 3a. Use anti-whip devices on compressor hoses. 3b. Monitor breathing zone with a calibrated PID and multi-gas meter. If vapors sustain levels > 5 ppm, the Roux field personnel must temporarily cease work, instruct all Site personnel to step away from the area of elevated readings and inform the Roux Project Manager of the condition. The Roux Project Manager will then recommend additional precautions. 3b. Wear dust masks as needed. 3b. Ensure no open flames/heat sources are present within the work area. 3b. Ensure vac truck is properly grounded prior to use. 3b. Do not use metal dig bar; use fiberglass or equivalent. 3c. Avoid contacting utilities directly with the high pressure air stream and using the air knife tip as a physical digging tool. 3c. Keep the air knife tip constantly moving to reduce direct pressure on a potential utility. 3c. Increase the distance between air knife tip and soil/utility. 3c. Continually remove soil slurry from hole with vacuum, which may have an abrasive effect on utility casings. 3d. Use proper body positioning and lifting techniques that minimizes muscle strain; keep back straight, lift with legs, keep load close to body, and never reach with a load.			

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<p>3. Pre-clearing with air knife and soil vacuum, and/or clearance with hand tools (continued)</p>	<p>3d. OVEREXERTION: (continued) Poor body positioning when handling equipment and materials.</p> <p>3e. FALL: Tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the Site.</p> <p>3f. CAUGHT: Pinch points associated with the equipment and vacuum hose.</p> <p>3g. EXPOSURE: Noise from vac truck and/or air compressor.</p>	<p>3d. Ensure that loads are balanced to reduce the potential for muscle strain.</p> <p>3d. Two people or a mechanical lifting aid are required when lifting objects over 50 lb. or when the shape makes the object difficult to lift.</p> <p>3e. Inspect walking path for uneven terrain, weather-related hazards (e.g., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment.</p> <p>3e. Walk around any stored materials/equipment; do not climb over. Practice good housekeeping.</p> <p>3e. Use established pathways and walk on stable, secure ground.</p> <p>3e. Equipment and tools will be stored at the lowest point of potential energy and out of the walkway and immediate work area (i.e., tools should not be propped against walls or nearby equipment or vehicles).</p> <p>3e. Equipment and tools that are not anticipated to be used will be returned to a storage area that is out of the immediate work area.</p> <p>3e. Ensure power cords/hoses are grouped when used within the work area. Mark out cords/hoses that cross pathways with traffic cones.</p> <p>3e. Ensure all Site personnel and equipment stay a minimum of 2 feet from an open hole. Mark out open holes with traffic cones/caution tape, etc.</p> <p>3e. Pre-cleared location will be finished flush to grade as to prevent a slip/trip hazard.</p> <p>3f. Always wear cut-resistant gloves when making connections and using hand tools.</p> <p>3f. Inspect the equipment prior to use for potential pinch points.</p> <p>3f. Test all emergency shutdown devices prior to using equipment.</p> <p>3f. Ensure all jewelry is removed, loose clothing is secured, and PPE is secured close to the body.</p> <p>3f. All non-essential personnel shall maintain a 10 foot exclusion zone; position body out of the line-of-fire of equipment.</p> <p>3f. Drillers and helpers will understand and use the "Show Me Your Hands Policy".</p> <p>3g. Wear hearing protection when vac truck and air compressor are in operation. Otherwise, if sound levels exceed 85 dB, don hearing protection.</p>
<p>4. Move drum to staging area using drum cart.</p>	<p>4a. EXPOSURE/CONTACT: Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, soil).</p> <p>4b. EXERTION: Muscle strain while maneuvering drums with drum cart/lift gate.</p> <p>4c. CAUGHT: Pinch points associated with handling drum lid.</p>	<p>4a. Wear chemically resistant gloves (i.e., Nitrile; worn in addition to cut resistant gloves).</p> <p>4a. Do not overfill drums. Ensure that the drum lids are attached securely.</p> <p>4a. Stage all drums in the designated storage area (per Roux Project Manager) and ensure they are labeled.</p> <p>4b. See 3d. Do not overfill drums. Use lift gate on back of truck to load and unload drums or drum cart to transport drums.</p> <p>4c. Ensure that fingers are not placed under the lid of the drum. Wear cut-resistant gloves. Use 15/16" ratchet while sealing drum lid.</p>
<p>5. Decontaminate equipment and tools.</p>	<p>5a. EXPOSURE/CONTACT: To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).</p> <p>5b. EXPOSURE: To chemicals in cleaning solution.</p>	<p>5a. See 4a.</p> <p>5a. Contain decontamination water (closed lid) so that it does not spill.</p> <p>5a. Use an absorbent pad to clean spills, if necessary.</p> <p>5a. Store all impacted materials/PPE in a designated storage container (per Roux Project Manager) and ensure the container is labeled.</p> <p>5b. See 4a.</p>

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JOB SAFETY ANALYSIS		Cntrl. No. GEN-012	DATE: 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: GENERIC		WORK TYPE: Gauging & Sampling	WORK ACTIVITY (Description): Soil Sampling		
DEVELOPMENT TEAM		POSITION / TITLE	REVIEWED BY:	POSITION / TITLE	
Jeff Wills		Project Hydrogeologist	Ray Fitzpatrick	OHSM	
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES <input checked="" type="checkbox"/> FLAME RESISTANT CLOTHING (as needed)	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD: <input checked="" type="checkbox"/> HEARING PROTECTION: (as needed) <input checked="" type="checkbox"/> SAFETY SHOES: Composite-toe or steel toe boots	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: Fluorescent reflective vest or high visibility clothing	<input checked="" type="checkbox"/> GLOVES: <u>Leather, Nitrile and cut resistant</u> <input checked="" type="checkbox"/> OTHER: <u>Insect Repellant, sunscreen (as needed)</u>		
REQUIRED AND / OR RECOMMENDED EQUIPMENT					
Recommended Equipment; 42" traffic cones, caution tape, trowel					
EXCLUSION ZONE: A minimum 10' exclusion zone will be maintained around moving equipment, if present.					
Assess 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS			
1. Secure location	<p>1a. CONTACT: Personnel and vehicular traffic may enter the work area.</p> <p>1b. FALL: Tripping/falling due to uneven terrain or entry/exit from excavations.</p> <p>1c. EXPOSURE: Exposure to sun and excessive heat, possibly causing sunburn, heat exhaustion or heat stroke, Exposure to cold temperatures possibly causing cold stress. Skin burn as a result of fire if occurred. Exposure to explosive vapors due to tank farm operations, Biological hazards - ticks, bees/wasps, poison ivy, thorns, insects, etc.</p>	<p>1a. If in an area with foot or vehicle traffic, delineate the work area with 42" traffic cones and/or caution tape to prevent exposure to traffic and inform others of work activity.</p> <p>1a. Wear reflective vest and/or fluorescent clothing.</p> <p>1a. Face the direction of any vehicular traffic. Position vehicle to protect worker from traffic.</p> <p>1a. Communicate work activity with adjacent work areas.</p> <p>1b. Inspect pathways and work area for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions.</p> <p>1b. Use established pathways and walk on stable, secure ground.</p> <p>1b. Stage equipment and tools will in a convenient, stable, and orderly manner. Store equipment at lowest potential energy.</p> <p>1b. Roux employees should stay 5 feet from in-progress excavations and trenches. Should entry to an excavation be appropriate (when stabilization is complete), ladders must be employed for steep embankments, excavations, pits, and trenches.</p> <p>1c. Wear sunscreen with an SPF 15 or greater whenever 30 minutes or more of exposure is expected.</p> <p>1c. Use a tent to shade the work area from direct sunlight particularly when warm temperatures are also expected.</p> <p>1c. Be aware of the location of all Site personnel.</p> <p>1c. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing).</p> <p>1c. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse).</p> <p>1c. Take breaks for rest and water as necessary. Move to an area that is well shaded or an area with air conditioning (i.e., car, site trailer, etc.). Move to an area that is warm.</p> <p>1c. No open flames/heat sources.</p> <p>1c. Flame resistant clothing must be worn when specified by Site policy.</p> <p>1c. Cell phones should be disabled when specified by Site policy.</p> <p>1c. Pre-treat field clothing with Permethrin prior to site visit to kill/repel ticks and insects.</p> <p>1c. Wear long sleeved shirts and tuck in (or tape) pant legs into socks or boots to prevent ticks from reaching skin.</p> <p>1c. Spray insect repellent containing DEET on exposed skin when working in overgrown areas of the Site.</p> <p>1c. Inspect area to avoid contact with biological hazards.</p> <p>1c. Wear cut-resistant gloves when handling branches, shrubs, etc. that may lie within the walking path.</p> <p>1c. Personnel shall examine themselves and co-worker's outer clothing for ticks periodically when onsite.</p> <p>1c. If skin comes in contact with poison ivy, wash skin thoroughly with soap and water.</p>			

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Assess ¹ JOB STEPS	Analyze ² POTENTIAL HAZARDS	Act ³ CRITICAL ACTIONS
2. Collect Soil Sample	<p>2a. CONTACT: Personal injury from pinch points, cuts, and abrasions from sampling equipment tools, and material within soil sample. Personal injury from contact with moving equipment while sampling.</p> <p>2b. EXPOSURE: Exposure to contamination (impacted soil) and/or lab preservatives.</p>	<p>2a. Wear cut-resistant (i.e., Kevlar) gloves under chemical-resistant disposable gloves when handling soil samples and sampling jars. 2a. Where possible, use trowel or equivalent tool to avoid contact with soil. 2a. If sampling from bucket of heavy equipment, ensure all equipment is off and operator utilizes the "show me your hands" policy. 2a. See 1a.</p> <p>2b. Wear chemical-resistant disposable gloves over cut resistant gloves to protect hands when handling samples; use containment material or plastic sheeting to protect surrounding areas. 2b. When collecting soil sample from hand auger, put large zip lock bag over entire auger to prevent spillage of soil on to the ground. 2b. Open sample jars slowly and fill carefully to avoid contact with preservatives.</p>
3. Decontaminate equipment	<p>3a. EXPOSURE/CONTACT: Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated vapors and/or soil).</p> <p>3b. EXPOSURE: Chemicals in cleaning solution including ammonia.</p>	<p>3a. Wear chemical-resistant disposable gloves and safety glasses. 3a. Use an absorbent pad to clean spills. 3a. Properly dispose of used materials/PPE in provided drums in designated drum storage area.</p> <p>3b. Wear chemical-resistant disposable gloves and safety glasses. 3b. Work on the upwind side of decon area. 3b. Use an absorbent pad to clean spills. 3b. Properly dispose of used materials/PPE in provided drums in designated drum storage area.</p>

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JOB SAFETY ANALYSIS Cntrl#: GEN-015		DATE 1/15/15	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: GENERIC	WORK TYPE: Drilling	WORK ACTIVITY (Description): Well Development		
DEVELOPMENT TEAM	POSITION / TITLE	REVIEWED BY:	POSITION / TITLE	
Amy Hoffman	Staff Geologist	Jeff Wills	Project Manager	
REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT				
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input type="checkbox"/> LIFELINE / BODY HARNESS <input checked="" type="checkbox"/> SAFETY GLASSES	<input type="checkbox"/> GOGGLES <input type="checkbox"/> FACE SHIELD <input checked="" type="checkbox"/> HEARING PROTECTION (as needed) <input checked="" type="checkbox"/> SAFETY SHOES: <u>Composite-toe or steel toe boots</u>	<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: <u>Fluorescent reflective vest or high visibility clothing</u>	<input checked="" type="checkbox"/> GLOVES: <u>Leather, Nitrile and cut resistant</u> <input checked="" type="checkbox"/> OTHER: <u>Insect repellent, sunscreen (as needed)</u>	
REQUIRED AND / OR RECOMMENDED EQUIPMENT				
Required Equipment as needed: Truck Rig or support truck, Trailer, 42 inch Safety cones and flags, Caution Tape, Interface Probe, Power Source, Submersible Pump, Surge Block/Plunger, 20 lb. Fire Extinguisher, Holding Tanks and/or Buckets, Tools as needed: Socket and Pipe Wrench, Screw Driver, Pry Bar, Ratchet, Vault Key.				
Maintain a 20 Foot Exclusion Zone During Development Activities				
“SHOW ME YOUR HANDS”				
Driller and helper should show that hands are clear from controls and moving parts				
Assess 1JOB STEPS	Analyze 2POTENTIAL HAZARDS	Act 3CRITICAL ACTIONS		
1. Mobilization / Demobilization (Review Mobilization and Demobilization JSA)	1a. CONTACT: Equipment/property damage. 1b. FALL: Slip/trip/fall hazards.	1a. The truck rig's tower/derrick will be lowered and secured prior to mobilization. 1a. Set-up the work area / position equipment in a manner that eliminates or reduces the need for backing of trucks and trailers. 1a. All non-essential personnel should maintain an exclusion zone of 20 feet. 1a. Beep horn twice before backing up. 1a. When backing up with an attached trailer use a spotter if there is tight clearance simultaneously on multiple sides of the equipment or if turning angles limit driver visibility. Stay away from the line-of-fire. 1a. Inspect the driving path for uneven terrain. Level or avoid if needed. 1b. Inspect walking path for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions prior to mobilizing equipment. 1b. Do not climb over stored materials/equipment; walk around. Store equipment at lowest potential energy.		
2. Open/close well.	2a. OVEREXERTION: Muscle strain (some wells have large vault covers). 2b. CAUGHT: Pinch points associated with removing/replacing manholes and working with hand tools. 2c. EXPOSURE: Potentially hazardous vapors. 2d. CONTACT: Traffic.	2a. Keep back straight, lift with legs, keep load close to body, and never reach with a load. Ensure that loads are balanced to reduce the potential for muscle strain. Two people are required when lifting objects over 50 lbs or when the shape makes the object difficult to lift. 2b. Wear leather gloves when working with well vault/cover and hand tools. Do not put fingers under well vault/cover. 2b. Use ratchet and pry bar for well cover and inspect before use. 2c. No open flames/heat sources. 2c. Allow well to vent after opening it and before starting development activities to minimize exposure to vapors. Air monitoring must be performed prior to set up and during the well development activities. Work on upwind side of well. 2d. Wear required PPE including high visibility clothing or reflective vest. 2d. Delineate work area with 42" safety cones and/or other barriers. Position vehicle to protect against oncoming traffic. 2d. Face traffic, maintain eye contact with oncoming vehicles, and establish a safe exit route.		

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Assess ¹ JOB STEPS	Analyze ² POTENTIAL HAZARDS	Act ³ CRITICAL ACTIONS
3. Develop well (mechanical surging).	<p>3a. CAUGHT: Cut hazards and finger pinch points.</p> <p>3b. CONTACT/EXPOSURE: Contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>3c. OVEREXERTION: Muscle strain from lifting equipment.</p> <p>3d. CONTACT: Injury while handling wench line/cable, or with active surging equipment</p>	<p>3a. See 2b.</p> <p>3a. Use required PPE including leather/cut-resistant gloves when handling development equipment. Identify finger/hand pinch points. Keep hands away from active surge equipment.</p> <p>3a. All non-essential personnel should maintain an exclusion zone of 20 feet.</p> <p>3b. See 2c.</p> <p>3b. Wear Nitrile gloves and safety glasses. Insert and remove surge block/plunger and line/cable slowly to avoid splashing at the surface.</p> <p>3b. Use an absorbent pad to clean any spills.</p> <p>3c. See 2a.</p> <p>3c. Use mechanical device to insert and remove surge block/plunger if greater than 50lb.</p> <p>3d. If using a drill rig, inspect all wench lines/cables for any kinks or if frayed prior to use. Replace any damaged lines/cables. Review Drill Rig checklist prior to development activities.</p> <p>3d. See 3a.</p>
4. Purging well (pumping water to holding tanks/drums/buckets).	<p>4a. CAUGHT: Pinch points associated with connecting hose to tank. Pinch points associated with handling pump and hoses.</p> <p>4b. FALL: Using side mounted ladder when attaching hose to tank. Slip, trip, fall from lines/hoses</p> <p>4c. CONTACT: Contamination (e.g., SPH, contaminated groundwater).</p> <p>4d. EXERTION: Muscle strain from lifting/carrying equipment.</p> <p>4e.FALL: Spilled purge water.</p>	<p>4a. See 3a.</p> <p>4a. Ensure that fingers are not placed near coupling when attaching and securing hose(s). Do not place fingers under pump/hoses. Wear leather or cut-resistant gloves when handling pump/hose(s).</p> <p>4a. Keep hands clear from any line of fire.</p> <p>4b. Inspect ladder steps make sure steps are not bent/damaged and free of debris/fluid.</p> <p>4b. Use three points of contact at all times when using ladder.</p> <p>4b. Utilize anti-whip cords on all compressed hoses. Keep hoses and lines coiled and organized out of designated walking paths around the work zone.</p> <p>4c. Secure water hose.</p> <p>4c. Do not overfill tanks, and purge/transfer liquids in such a manner that they do not splash. (See 3b).</p> <p>4c. Dispose of used materials/PPE in the designated impacted PPE container.</p> <p>4d. Use lifting techniques to minimize muscle strain when carrying equipment. When possible, use mechanic means to lift equipment.</p> <p>4d. Use two people to lift any equipment or material that is over 50 lbs.</p> <p>4e. Clean up any spills using absorbent pads or spill kits.</p>
5. Decontaminate equipment	<p>5a. CONTACT/EXPOSURE: Contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>5b. EXPOSURE/CONTACT: Chemicals in cleaning solution</p>	<p>5a. See 3b.</p> <p>5b. Decontaminate equipment in well-ventilated area. Wear nitrile gloves to avoid skin contact with cleaning solutions.</p>

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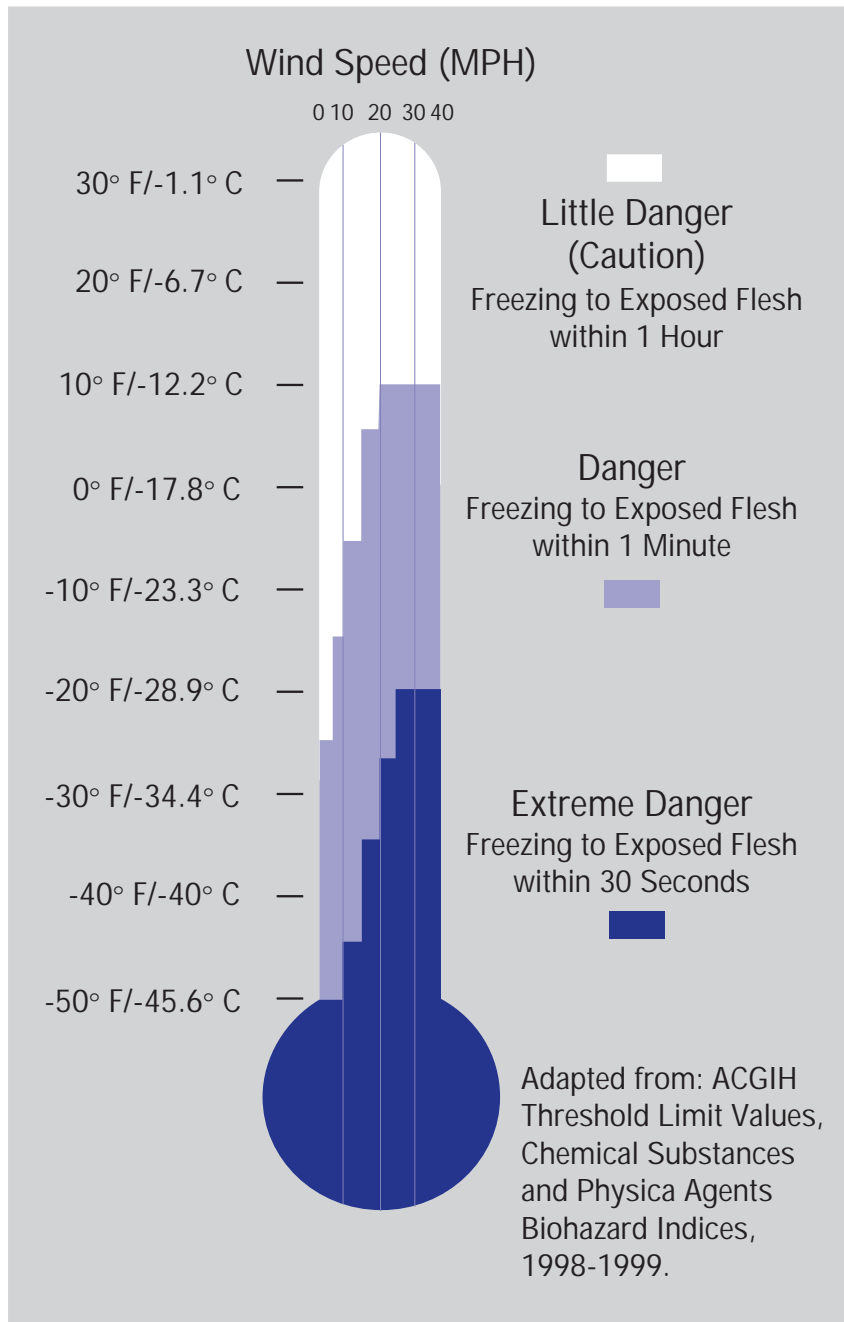
Heat and Cold Stress Guidelines

THE COLD STRESS EQUATION

**LOW TEMPERATURE + WIND SPEED + WETNESS
= INJURIES & ILLNESS**

When the body is unable to warm itself, serious cold-related illnesses and injuries may occur, and permanent tissue damage and death may result.

Hypothermia can occur when *land temperatures* are **above** freezing or *water temperatures* are below 98.6°F/ 37°C. Cold-related illnesses can slowly overcome a person who has been chilled by low temperatures, brisk winds, or wet clothing.



FROST BITE

What Happens to the Body:

FREEZING IN DEEP LAYERS OF SKIN AND TISSUE; PALE, WAXY-WHITE SKIN COLOR; SKIN BECOMES HARD and NUMB; USUALLY AFFECTS THE FINGERS, HANDS, TOES, FEET, EARS, and NOSE.

What Should Be Done: (land temperatures)

- Move the person to a warm dry area. Don't leave the person alone.
- Remove any wet or tight clothing that may cut off blood flow to the affected area.
- **DO NOT** rub the affected area, because rubbing causes damage to the skin and tissue.
- **Gently** place the affected area in a warm (105°F) water bath and monitor the water temperature to **slowly** warm the tissue. Don't pour warm water directly on the affected area because it will warm the tissue too fast causing tissue damage. Warming takes about 25-40 minutes.
- After the affected area has been warmed, it may become puffy and blister. The affected area may have a burning feeling or numbness. When normal feeling, movement, and skin color have returned, the affected area should be dried and wrapped to keep it warm. **NOTE:** If there is a chance the affected area may get cold again, do not warm the skin. If the skin is warmed and then becomes cold again, it will cause severe tissue damage.
- Seek medical attention as soon as possible.

HYPOTHERMIA - (Medical Emergency)

What Happens to the Body:

NORMAL BODY TEMPERATURE (98.6° F/37°C) DROPS TO OR BELOW 95°F (35° C); FATIGUE OR DROWSINESS; UNCONTROLLED SHIVERING; COOL BLUISH SKIN; SLURRED SPEECH; CLUMSY MOVEMENTS; IRRITABLE, IRRATIONAL OR CONFUSED BEHAVIOR.

What Should Be Done: (land temperatures)

- Call for emergency help (i.e., Ambulance or Call 911).
- Move the person to a warm, dry area. Don't leave the person alone. Remove any wet clothing and replace with warm, dry clothing or wrap the person in blankets.
- Have the person drink warm, sweet drinks (sugar water or sports-type drinks) if they are alert. **Avoid drinks with caffeine** (coffee, tea, or hot chocolate) or alcohol.
- Have the person move their arms and legs to create muscle heat. If they are unable to do this, place warm bottles or hot packs in the arm pits, groin, neck, and head areas. **DO NOT** rub the person's body or place them in warm water bath. This may stop their heart.

What Should Be Done: (water temperatures)

- Call for emergency help (Ambulance or Call 911). Body heat is lost up to 25 times faster in water.
- **DO NOT** remove any clothing. Button, buckle, zip, and tighten any collars, cuffs, shoes, and hoods because the layer of trapped water closest to the body provides a layer of insulation that slows the loss of heat. Keep the head out of the water and put on a hat or hood.
- Get out of the water as quickly as possible or climb on anything floating. **DO NOT** attempt to swim unless a floating object or another person can be reached because swimming or other physical activity uses the body's heat and reduces survival time by about 50 percent.
- If getting out of the water is not possible, wait quietly and conserve body heat by folding arms across the chest, keeping thighs together, bending knees, and crossing ankles. If another person is in the water, huddle together with chests held closely.

How to Protect Workers

- Recognize the environmental and workplace conditions that lead to potential cold-induced illnesses and injuries.
- Learn the signs and symptoms of cold-induced illnesses/injuries and what to do to help the worker.
- Train the workforce about cold-induced illnesses and injuries.
- Select proper clothing for cold, wet, and windy conditions. Layer clothing to adjust to changing environmental temperatures. Wear a hat and gloves, in addition to underwear that will keep water away from the skin (polypropylene).
- Take frequent short breaks in warm dry shelters to allow the body to warm up.
- Perform work during the warmest part of the day.
- Avoid exhaustion or fatigue because energy is needed to keep muscles warm.
- Use the buddy system (work in pairs).
- Drink warm, sweet beverages (sugar water, sports-type drinks). Avoid drinks with caffeine (coffee, tea, or hot chocolate) or alcohol.
- Eat warm, high-calorie foods like hot pasta dishes.

Workers Are at Increased Risk When...

- They have predisposing health conditions such as cardiovascular disease, diabetes, and hypertension.
- They take certain medication (check with your doctor, nurse, or pharmacy and ask if any medicines you are taking affect you while working in cold environments).
- They are in poor physical condition, have a poor diet, or are older.

Protecting Workers from Heat Stress

Heat Illness

Exposure to heat can cause illness and death. The most serious heat illness is heat stroke. Other heat illnesses, such as heat exhaustion, heat cramps and heat rash, should also be avoided.

There are precautions your employer should take any time temperatures are high and the job involves physical work.

Risk Factors for Heat Illness

- High temperature and humidity, direct sun exposure, no breeze or wind
- Low liquid intake; previous heat illnesses
- Heavy physical labor
- Waterproof clothing
- No recent exposure to hot workplaces

Symptoms of Heat Exhaustion

- Headache, dizziness, or fainting
- Weakness and wet skin
- Irritability or confusion
- Thirst, nausea, or vomiting

Symptoms of Heat Stroke

- May be confused, unable to think clearly, pass out, collapse, or have seizures (fits)
- May stop sweating

To Prevent Heat Illness, Your Employer Should

- Provide training about the hazards leading to heat stress and how to prevent them.
- Provide a lot of cool water to workers close to the work area. At least one pint of water per hour is needed.



For more complete information:

- Schedule frequent rest periods with water breaks in shaded or air-conditioned areas.
- Routinely check workers who are at risk of heat stress due to protective clothing and high temperature.
- Consider protective clothing that provides cooling.



How You Can Protect Yourself and Others

- Know signs/symptoms of heat illnesses; monitor yourself; use a buddy system.
- Block out direct sun and other heat sources.
- Drink plenty of fluids. Drink often and BEFORE you are thirsty.
- Avoid beverages containing alcohol or caffeine.
- Wear lightweight, light colored, loose-fitting clothes.
- Be aware that poor physical condition, some health problems (such as high blood pressure or diabetes), pregnancy, colds and flu, and some medications can increase your personal risk. If you are under treatment, ask your healthcare provider.



What to Do When a Worker is Ill from the Heat

- Call a supervisor for help. If the supervisor is not available, call 911.
- Have someone stay with the worker until help arrives.
- Move the worker to a cooler/shaded area.
- Remove outer clothing.
- Fan and mist the worker with water; apply ice (ice bags or ice towels).
- Provide cool drinking water, if able to drink.

IF THE WORKER IS NOT ALERT or seems confused, this may be a heat stroke. CALL 911 IMMEDIATELY and apply ice as soon as possible.

If you have any questions or concerns, call OSHA at 1-800-321-OSHA.

For more complete information:



U.S. Department of Labor

www.osha.gov (800) 321-OSHA



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SECTION III: CHAPTER 4

HEAT STRESS

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I. INTRODUCTION.

Operations involving high air temperatures, radiant heat sources, high humidity, direct physical contact with hot objects, or strenuous physical activities have a high potential for inducing heat stress in employees engaged in such operations. Such places include: iron and steel foundries, nonferrous foundries, brick-firing and ceramic plants, glass products facilities, rubber products factories, electrical utilities (particularly boiler rooms), bakeries, confectioneries, commercial kitchens, laundries, food canneries, chemical plants, mining sites, smelters, and steam tunnels.

Outdoor operations conducted in hot weather, such as construction, refining, asbestos removal, and hazardous waste site activities, especially those that require workers to wear semipermeable or impermeable protective clothing, are also likely to cause heat stress among exposed workers.

A. CAUSAL FACTORS.

1. Age, weight, degree of physical fitness, degree of acclimatization, metabolism, use of alcohol or drugs, and a variety of medical conditions such as hypertension all affect a person's sensitivity to heat. However, even the type of clothing worn must be considered. Prior heat injury predisposes an individual to additional injury.
2. It is difficult to predict just who will be affected and when, because individual susceptibility varies. In addition, environmental factors include more than the ambient air temperature. Radiant heat, air movement, conduction, and relative humidity all affect an individual's response to heat.

B. DEFINITIONS.

1. The American Conference of Governmental Industrial Hygienists (1992) states that workers should not be permitted to work when their deep body temperature exceeds 38°C (100.4°F).
2. **Heat** is a measure of energy in terms of quantity.

3. A **calorie** is the amount of heat required to raise 1 gram of water 1°C (based on a standard temperature of 16.5 to 17.5°C).
4. **Conduction** is the transfer of heat between materials that contact each other. Heat passes from the warmer material to the cooler material. For example, a worker's skin can transfer heat to a contacting surface if that surface is cooler, and vice versa.
5. **Convection** is the transfer of heat in a moving fluid. Air flowing past the body can cool the body if the air temperature is cool. On the other hand, air that exceeds 35°C (95°F) can increase the heat load on the body.
6. **Evaporative cooling** takes place when sweat evaporates from the skin. High humidity reduces the rate of evaporation and thus reduces the effectiveness of the body's primary cooling mechanism.
7. **Radiation** is the transfer of heat energy through space. A worker whose body temperature is greater than the temperature of the surrounding surfaces radiates heat to these surfaces. Hot surfaces and infrared light sources radiate heat that can increase the body's heat load.
8. **Globe temperature** is the temperature inside a blackened, hollow, thin copper globe.
9. **Metabolic heat** is a by-product of the body's activity.
10. **Natural wet bulb (NWB) temperature** is measured by exposing a wet sensor, such as a wet cotton wick fitted over the bulb of a thermometer, to the effects of evaporation and convection. The term natural refers to the movement of air around the sensor.
11. **Dry bulb (DB) temperature** is measured by a thermal sensor, such as an ordinary mercury-in-glass thermometer, that is shielded from direct radiant energy sources.

II. HEAT DISORDERS AND HEALTH EFFECTS.

- A. **HEAT STROKE** occurs when the body's system of temperature regulation fails and body temperature rises to critical levels. This condition is caused by a combination of highly variable factors, and its occurrence is difficult to predict. Heat stroke is a medical emergency. The primary signs and symptoms of heat stroke are confusion; irrational behavior; loss of consciousness; convulsions; a lack of sweating (usually); hot, dry skin; and an abnormally high body temperature, e.g., a rectal temperature of 41°C (105.8°F). If body temperature is too high, it causes death. The elevated metabolic temperatures caused by a combination of work load and environmental heat load, both of which contribute to heat stroke, are also highly variable and difficult to predict.

If a worker shows signs of possible heat stroke, professional medical treatment should be obtained immediately. The worker should be placed in a shady area and the outer clothing should be removed. The worker's skin should be wetted and air movement around the worker should be increased to improve evaporative cooling until professional methods of cooling are initiated and the seriousness of the condition can be assessed. Fluids should be replaced as soon as possible. The medical outcome of an episode of heat stroke depends on the victim's physical fitness and the timing and effectiveness of first aid treatment.

Regardless of the worker's protests, no employee suspected of being ill from heat stroke should be sent home or left unattended unless a physician has specifically approved such an order.

- B. **HEAT EXHAUSTION.** The signs and symptoms of heat exhaustion are headache, nausea, vertigo, weakness, thirst, and giddiness. Fortunately, this condition responds readily to prompt treatment. Heat exhaustion should not be dismissed lightly, however, for several reasons. One is that the fainting associated with heat exhaustion can be dangerous because the victim may be operating machinery or controlling an operation that should not be left unattended; moreover, the victim may be injured when he or she faints. Also, the signs and symptoms seen in heat exhaustion are similar to those of heat stroke, a medical emergency.

Workers suffering from heat exhaustion should be removed from the hot environment and given fluid replacement. They should also be encouraged to get adequate rest.

- C. **HEAT CRAMPS** are usually caused by performing hard physical labor in a hot environment. These cramps have been attributed to an electrolyte imbalance caused by sweating. It is important to understand that cramps can be caused by both too much and too little salt. Cramps appear to be caused by the lack of water replenishment. Because sweat is a hypotonic solution ($\pm 0.3\%$ NaCl), excess salt can build up in the body if the water lost through sweating is not replaced. Thirst cannot be relied on as a guide to the need for water; instead, water must be taken every 15 to 20 minutes in hot environments.

Under extreme conditions, such as working for 6 to 8 hours in heavy protective gear, a loss of sodium may occur. Recent studies have shown that drinking commercially available carbohydrate-electrolyte replacement liquids is effective in minimizing physiological disturbances during recovery.

- D. **HEAT COLLAPSE ("Fainting").** In heat collapse, the brain does not receive enough oxygen because blood pools in the extremities. As a result, the exposed individual may lose consciousness. This reaction is similar to that of heat exhaustion and does not affect the body's heat balance. However, the onset of heat collapse is rapid and unpredictable. To prevent heat collapse, the worker should gradually become acclimatized to the hot environment.

- E. **HEAT RASHES** are the most common problem in hot work environments. Prickly heat is manifested as red papules and usually appears in areas where the clothing is restrictive. As sweating increases, these papules give rise to a prickling sensation. Prickly heat occurs in skin that is persistently wetted by unevaporated sweat, and heat rash papules may become infected if they are not treated. In most cases, heat rashes will disappear when the affected individual returns to a cool environment.
- F. **HEAT FATIGUE.** A factor that predisposes an individual to heat fatigue is lack of acclimatization. The use of a program of acclimatization and training for work in hot environments is advisable. The signs and symptoms of heat fatigue include impaired performance of skilled sensorimotor, mental, or vigilance jobs. There is no treatment for heat fatigue except to remove the heat stress before a more serious heat-related condition develops.

III. INVESTIGATION GUIDELINES.

These guidelines for evaluating employee heat stress approximate those found in the 1992-1993 ACGIH publication, *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.*

A. EMPLOYER AND EMPLOYEE INTERVIEWS.

- 1. The inspector will review the OSHA 200 Log and, if possible, the OSHA 101 forms for indications of prior heat stress problems.
- 2. Following are some questions for employer interviews: What type of action, if any, has the employer taken to prevent heat stress problems? What are the potential sources of heat? What employee complaints have been made?
- 3. Following are some questions for employee interviews: What heat stress problems have been experienced? What type of action has the employee taken to minimize heat stress? What is the employer's involvement, i.e., does employee training include information on heat stress? (Appendix III:4-1 lists factors to be evaluated when reviewing a heat stress situation, and Appendix III:4-2 contains a follow-up checklist.)

B. WALKAROUND INSPECTION. During the walkaround inspection, the investigator will: determine building and operation characteristics; determine whether engineering controls are functioning properly; verify information obtained from the employer and employee interviews; and perform temperature measurements and make other determinations to identify potential sources of heat stress. Investigators may wish to discuss any operations that have the potential to cause heat stress with engineers and other knowledgeable personnel. The walkaround inspection should cover all affected areas. Heat sources, such as furnaces, ovens, and boilers, and relative heat load per employee should be noted.

C. WORK-LOAD ASSESSMENT.

- 1. Under conditions of high temperature and heavy workload, the CSHO should determine the work-load category of each job (Table III:4-1 and Figure III:4-1). Work-load category is determined by averaging metabolic rates for the tasks and then ranking them:
 - 1. Light work: up to 200 kcal/hour
 - 2. Medium work: 200-350 kcal/hour
 - 3. Heavy work: 350-500 kcal/hour

2. *Cool Rest Area:* Where heat conditions in the rest area are different from those in the work area, the metabolic rate (M) should be calculated using a time-weighted average, as follows:

Equation III: 4-1. Average Metabolic Rate

$$Average_M = \frac{(M_1)(t_1) + (M_2)(t_2) + \dots + (M_n)(t_n)}{(t_1) + (t_2) + \dots + (t_n)}$$

where: M = metabolic rate
 t = time in minutes

In some cases, a videotape is helpful in evaluating work practices and metabolic load.

FIGURE III:4-1. ACTIVITY EXAMPLES

- Light hand work: writing, hand knitting
- Heavy hand work: typewriting
- Heavy work with one arm: hammering in nails (shoemaker, upholsterer)
- Light work with two arms: filing metal, planing wood, raking the garden
- Moderate work with the body: cleaning a floor, beating a carpet
- Heavy work with the body: railroad track laying, digging, barking trees

Sample Calculation: Assembly line work using a heavy hand tool

Walking along	2.0 kcal/min
Intermediate value between heavy work with two arms and light work with the body	3.0 kcal/min
Add for basal metabolism	1.0 kcal/min
Total:	6.0 kcal/min

Source: ACGIH 1992.

TABLE III:4-1. ASSESSMENT OF WORK

<i>Body position and movement</i>		<i>kcal/min*</i>	
Sitting		0.3	
Standing		0.6	
Walking		2.0-3.0	
Walking uphill		add 0.8 for every meter (yard) rise	
Type of work	Average kcal/min	Range kcal/min	
Hand work			
Light	0.4	0.2-1.2	
Heavy	0.9		
Work: One arm			
Light	1.0	0.7-2.5	
Heavy	1.7		
Work: Both arms			
Light	1.5	1.0-3.5	
Heavy	2.5		
Work: Whole body			
Light	3.5	2.5-15.0	
Moderate	5.0		
Heavy	7.0		
Very heavy	9.0		
* For a "standard" worker of 70 kg body weight (154 lbs) and 1.8m ² body surface (19.4 ft ²).			

Source: ACGIH 1992.

IV. SAMPLING METHODS.

- A. **BODY TEMPERATURE MEASUREMENTS.** Although instruments are available to estimate deep body temperature by measuring the temperature in the ear canal or on the skin, these instruments are not sufficiently reliable to use in compliance evaluations.
- B. **ENVIRONMENTAL MEASUREMENTS.** Environmental heat measurements should be made at, or as close as possible to, the specific work area where the worker is exposed. When a worker is not continuously exposed in a single hot area but moves between two or more areas having different levels of environmental heat, or when the environmental heat varies substantially at a single hot area, environmental heat exposures should be measured for each area and for each level of environmental heat to which employees are exposed.
- C. **WET BULB GLOBE TEMPERATURE INDEX.**

- 1. Wet Bulb Globe Temperature (WBGT) should be calculated using the appropriate formula in [Appendix III:4-2](#). The

WBGT for continuous all-day or several hour exposures should be averaged over a 60-minute period. Intermittent exposures should be averaged over a 120-minute period. These averages should be calculated using the following formula:

Equation III:4-2. Average Web Bulb Globe Temperature (WBGT)

$$Average_{WBGT} = \frac{(WBGT_1)(t_1) + (WBGT_2)(t_2) + \dots + (WBGT_n)(t_n)}{(t_1) + (t_2) + \dots + (t_n)}$$

For indoor and outdoor conditions with no solar load, WBGT is calculated as:

$$WBGT = 0.7NWB + 0.3GT$$

For outdoors with a solar load, WBGT is calculated as

$$WBGT = 0.7NWB + 0.2GT + 0.1DB$$

- where:
- WBGT = Wet Bulb Globe Temperature Index
 - NWB = Nature Wet-Bulb Temperature
 - DB = Dry-Bulb Temperature
 - GT = Globe Temperature

2. The exposure limits in Table III:4-2 are valid for employees wearing light clothing. They must be adjusted for the insulation from clothing that impedes sweat evaporation and other body cooling mechanisms. Use Table III:4-3 to correct Table III:4-2 for various kinds of clothing.
 3. Use of Table III:4-2 requires knowledge of the WBGT and approximate workload. Workload can be estimated using the data in Table III:4-1, and sample calculations are presented in Figure III:4-1.
- D. **MEASUREMENT.** Portable heat stress meters or monitors are used to measure heat conditions. These instruments can calculate both the indoor and outdoor WBGT index according to established ACGIH Threshold Limit Value equations. With this information and information on the type of work being performed, heat stress meters can determine how long a person can safely work or remain in a particular hot environment. See Appendix III:4-2 for an alternate method of calculation.

TABLE III:4-2. PERMISSIBLE HEAT EXPOSURE THRESHOLD LIMIT VALUE

Work/rest regimen	----- Work Load* -----		
	Light	Moderate	Heavy
Continuous work	30.0°C (86°F)	26.7°C (80°F)	25.0°C (77°F)
75% Work, 25% rest, each hour	30.6°C (87°F)	28.0°C (82°F)	25.9°C (78°F)
50% Work, 50% rest, each hour	31.4°C (89°F)	29.4°C (85°F)	27.9°C (82°F)
25% Work, 75% rest, each hour	32.2°C (90°F)	31.1°C (88°F)	30.0°C (86°F)

*Values are in °C and °F, WBGT.

These TLV's are based on the assumption that nearly all acclimatized, fully clothed workers with adequate water and salt intake should be able to function effectively under the given working conditions without exceeding a deep body temperature of 38°C (100.4° F). They are also based on the assumption that the WBGT of the resting place is the same or very close to that of the workplace. Where the WBGT of the work area is different from that of the rest area, a time-weighted average should be used (consult the ACGIH 1992-1993 *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices* (1992).

These TLV's apply to physically fit and acclimatized individuals wearing light summer clothing. If heavier clothing that impedes sweat or has a higher insulation value is required, the permissible heat exposure TLV's in Table III:4-2 must be reduced by the corrections shown in Table III:4-3.

Source: ACGIH 1992.

E. OTHER THERMAL STRESS INDICES.

1. The Effective Temperature index (ET) combines the temperature, the humidity of the air, and air velocity. This index has been used extensively in the field of comfort ventilation and air-conditioning. ET remains a useful measurement technique in mines and other places where humidity is high and radiant heat is low.
2. The Heat-Stress Index (HSI) was developed by Belding and Hatch in 1965. Although the HSI considers all environmental factors and work rate, it is not completely satisfactory for determining an individual worker's heat stress and is also difficult to use.

TABLE III:4-3. WBGT CORRECTION FACTORS IN °C

Clothing type	Clo* value	WBGT correction
Summer lightweight working clothing	0.6	0
Cotton coveralls	1.0	-2
Winter work clothing	1.4	-4
Water barrier, permeable	1.2	-6

*Clo: Insulation value of clothing. One clo = 5.55 kcal/m²/hr of heat exchange by radiation and convection for each degree °C difference in temperature between the skin and the adjusted dry bulb temperature.

Note: Deleted from the previous version are trade names and "fully encapsulating suit, gloves, boots and hood" including its clo value of 1.2 and WBGT correction of -10.

Source: ACGIH 1992.

V. CONTROL.

Ventilation, air cooling, fans, shielding, and insulation are the five major types of engineering controls used to reduce heat stress in hot work environments. Heat reduction can also be achieved by using power assists and tools that reduce the physical demands placed on a worker.

However, for this approach to be successful, the metabolic effort required for the worker to use or operate these devices must be less than the effort required without them. Another method is to reduce the effort necessary to operate power assists. The worker should be allowed to take frequent rest breaks in a cooler environment.

A. ACCLIMATIZATION.

1. The human body can adapt to heat exposure to some extent. This physiological adaptation is called acclimatization. After a period of acclimatization, the same activity will produce fewer cardiovascular demands. The worker will sweat more efficiently (causing better evaporative cooling), and thus will more easily be able to maintain normal body temperatures.
2. A properly designed and applied acclimatization program decreases the risk of heat-related illnesses. Such a program basically involves exposing employees to work in a hot environment for progressively longer periods. NIOSH (1986) says that, for workers who have had previous experience in jobs where heat levels are high enough to produce heat stress, the regimen should be 50% exposure on day one, 60% on day two, 80% on day three, and 100% on day four. For new workers who will be similarly exposed, the regimen should be 20% on day one, with a 20% increase in exposure each additional day.

B. FLUID REPLACEMENT. Cool (50°-60°F) water or any cool liquid (except alcoholic beverages) should be made available to workers to encourage them to drink small amounts frequently, e.g., one cup every 20 minutes. Ample supplies of liquids should be placed close to the work area. Although some commercial replacement drinks contain salt, this is not necessary for acclimatized individuals because most people add enough salt to their summer diets.

C. ENGINEERING CONTROLS.

1. **General ventilation** is used to dilute hot air with cooler air (generally cooler air that is brought in from the outside). This technique clearly works better in cooler climates than in hot ones. A permanently installed ventilation system usually handles large areas or entire buildings. Portable or local exhaust systems may be more effective or practical in smaller areas.
2. **Air treatment/air cooling** differs from ventilation because it reduces the temperature of the air by removing heat (and sometimes humidity) from the air.
3. **Air conditioning** is a method of air cooling, but it is expensive to install and operate. An alternative to air conditioning is the use of chillers to circulate cool water through heat exchangers over which air from the ventilation system is then passed; chillers are more efficient in cooler climates or in dry climates where

evaporative cooling can be used.

4. **Local air cooling** can be effective in reducing air temperature in specific areas. Two methods have been used successfully in industrial settings. One type, cool rooms, can be used to enclose a specific workplace or to offer a recovery area near hot jobs. The second type is a portable blower with built-in air chiller. The main advantage of a blower, aside from portability, is minimal set-up time.
5. Another way to reduce heat stress is to increase the air flow or **convection** using fans, etc. in the work area (as long as the air temperature is less than the worker's skin temperature). Changes in air speed can help workers stay cooler by increasing both the convective heat exchange (the exchange between the skin surface and the surrounding air) and the rate of evaporation. Because this method does not actually cool the air, any increases in air speed must impact the worker directly to be effective.

If the dry bulb temperature is higher than 35°C (95°F), the hot air passing over the skin can actually make the worker hotter. When the temperature is more than 35°C and the air is dry, evaporative cooling may be improved by air movement, although this improvement will be offset by the convective heat. When the temperature exceeds 35°C and the relative humidity is 100%, air movement will make the worker hotter. Increases in air speed have no effect on the body temperature of workers wearing vapor-barrier clothing.

6. **Heat conduction** methods include insulating the hot surface that generates the heat and changing the surface itself.
7. Simple engineering controls, such as shields, can be used to reduce radiant **heat**, i.e. heat coming from hot surfaces within the worker's line of sight. Surfaces that exceed 35°C (95°F) are sources of infrared radiation that can add to the worker's heat load. Flat black surfaces absorb heat more than smooth, polished ones. Having cooler surfaces surrounding the worker assists in cooling because the worker's body radiates heat toward them.

With some sources of radiation, such as heating pipes, it is possible to use both insulation and surface modifications to achieve a substantial reduction in radiant heat. Instead of reducing radiation from the source, shielding can be used to interrupt the path between the source and the worker. Polished surfaces make the best barriers, although special glass or metal mesh surfaces can be used if visibility is a problem.

Shields should be located so that they do not interfere with air flow, unless they are also being used to reduce convective heating. The reflective surface of the shield should be kept clean to maintain its effectiveness.

D. ADMINISTRATIVE CONTROLS AND WORK PRACTICES.

1. Training is the key to good work practices. Unless all employees understand the reasons for using new, or changing old, work practices, the chances of such a program succeeding are greatly reduced.
2. NIOSH (1986) states that a good heat stress training program should include at least the following components:
 - Knowledge of the hazards of heat stress;
 - Recognition of predisposing factors, danger signs, and symptoms;
 - Awareness of first-aid procedures for, and the potential health effects of, heat stroke;
 - Employee responsibilities in avoiding heat stress;
 - Dangers of using drugs, including therapeutic ones, and alcohol in hot work environments;
 - Use of protective clothing and equipment; and
 - Purpose and coverage of environmental and medical surveillance programs and the advantages of worker participation in such programs.
3. Hot jobs should be scheduled for the cooler part of the day, and routine maintenance and repair work in hot areas should be scheduled for the cooler seasons of the year.

E. WORKER MONITORING PROGRAMS.

1. Every worker who works in extraordinary conditions that increase the risk of heat stress should be personally monitored. These conditions include wearing semipermeable or impermeable clothing when the temperature exceeds 21°C (69.8°F), working at extreme metabolic loads (greater than 500 kcal/hour), etc.
2. Personal monitoring can be done by checking the heart rate, recovery heart rate, oral temperature, or extent of body water loss.
3. To check the heart rate, count the radial pulse for 30 seconds at the beginning of the rest period. If the heart rate exceeds 110 beats per minute, shorten the next work period by one third and maintain the same rest period.
4. The recovery heart rate can be checked by comparing the pulse rate taken at 30 seconds (P_1) with the pulse rate taken at 2.5 minutes (P_3) after the rest break starts. The two pulse rates can be interpreted using Table III:4-4.
5. Oral temperature can be checked with a clinical thermometer after work but before the employee drinks water. If the oral temperature taken under the tongue exceeds 37.6°C, shorten the next work cycle by one third.
6. Body water loss can be measured by weighing the worker on a scale at the beginning and end of each work day.

The worker's weight loss should not exceed 1.5% of total body weight in a work day. If a weight loss exceeding this amount is observed, fluid intake should increase.

F. **OTHER ADMINISTRATIVE CONTROLS.** The following administrative controls can be used to reduce heat stress:

- Reduce the physical demands of work, e.g., excessive lifting or digging with heavy objects;
- Provide recovery areas, e.g., air-conditioned enclosures and rooms;
- Use shifts, e.g., early morning, cool part of the day, or night work;
- Use intermittent rest periods with water breaks;
- Use relief workers;
- Use worker pacing; and
- Assign extra workers and limit worker occupancy, or the number of workers present, especially in confined or enclosed spaces.

TABLE III:4-4. HEART RATE RECOVERY CRITERIA

Heart rate recovery pattern	P ₃	Difference between P ₁ and P ₃
Satisfactory recovery	<90	--
High recovery (Conditions may require further study)	90	10
No recovery (May indicate too much stress)	90	<10

VI. **PERSONAL PROTECTIVE EQUIPMENT.**

A. **REFLECTIVE CLOTHING**, which can vary from aprons and jackets to suits that completely enclose the worker from neck to feet, can stop the skin from absorbing radiant heat. However, since most reflective clothing does not allow air exchange through the garment, the reduction of radiant heat must more than offset the corresponding loss in evaporative cooling. For this reason, reflective clothing should be worn as loosely as possible. In situations where radiant heat is high, auxiliary cooling systems can be used under the reflective clothing.

B. **AUXILIARY BODY COOLING.**

1. Commercially available **ice vests**, though heavy, may accommodate as many as 72 ice packets, which are usually filled with water. Carbon dioxide (dry ice) can also be used as a coolant. The cooling offered by ice packets lasts only 2 to 4 hours at moderate to heavy heat loads, and frequent replacement is necessary. However, ice vests do not encumber the worker and thus permit maximum mobility. Cooling with ice is also relatively inexpensive.
2. **Wetted clothing** is another simple and inexpensive personal cooling technique. It is effective when reflective or other impermeable protective clothing is worn. The clothing may be wetted terry cloth coveralls or wetted two-piece, whole-body cotton suits. This approach to auxiliary cooling can be quite effective under conditions of high temperature and low humidity, where evaporation from the wetted garment is not restricted.
3. **Water-cooled garments** range from a hood, which cools only the head, to vests and "long johns," which offer partial or complete body cooling. Use of this equipment requires a battery-driven circulating pump, liquid-ice coolant, and a container.

Although this system has the advantage of allowing wearer mobility, the weight of the components limits the amount of ice that can be carried and thus reduces the effective use time. The heat transfer rate in liquid cooling systems may limit their use to low-activity jobs; even in such jobs, their service time is only about 20 minutes per pound of cooling ice. To keep outside heat from melting the ice, an outer insulating jacket should be an integral part of these systems.

4. **Circulating air** is the most highly effective, as well as the most complicated, personal cooling system. By directing compressed air around the body from a supplied air system, both evaporative and convective cooling are improved. The greatest advantage occurs when circulating air is used with impermeable garments or double cotton overalls.

One type, used when respiratory protection is also necessary, forces exhaust air from a supplied-air hood ("bubble hood") around the neck and down inside an impermeable suit. The air then escapes through openings in the suit. Air can also be supplied directly to the suit without using a hood in three ways:

- by a single inlet;
- by a distribution tree; or
- by a perforated vest.

In addition, a vortex tube can be used to reduce the temperature of circulating air. The cooled air from this tube can be introduced either under the clothing or into a bubble hood. The use of a vortex tube separates the air stream into a hot and cold stream; these tubes also can be used to supply heat in cold climates. Circulating air, however, is noisy and requires a constant source of compressed air supplied through an attached air hose.

One problem with this system is the limited mobility of workers whose suits are attached to an air hose. Another is that of getting air to the work area itself. These systems should therefore be used in work areas where workers are not required to move around much or to climb. Another concern with these systems is that they can lead to dehydration. The cool, dry air feels comfortable and the worker may not realize that it is important to drink liquids frequently.

- C. **RESPIRATOR USAGE.** The weight of a self-contained breathing apparatus (SCBA) increases stress on a worker, and this stress contributes to overall heat stress. Chemical protective clothing such as totally encapsulating chemical protection suits will also add to the heat stress problem.

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APPENDIX III:4-1. HEAT STRESS: GENERAL WORKPLACE REVIEW.

NOTE: Listed below are sample questions that the Compliance Officer may wish to consider when investigating heat stress in the workplace.

WORKPLACE DESCRIPTION.

- A. Type of business
- B. Heat-producing equipment or processes used
- C. Previous history (if any) of heat-related problems
- D. At "hot" spots:
 - Is the heat steady or intermittent?
 - Number of employees exposed?
 - For how many hours per day?
 - Is potable water available?
 - Are supervisors trained to detect/evaluate heat stress symptoms?

ARE EXPOSURES TYPICAL FOR A WORKPLACE IN THIS INDUSTRY?

- A. Weather at Time of Review
- B. Temperature
- C. Humidity
- D. Air velocity
- E. Is Day Typical of Recent Weather Conditions?
(Get information from the Weather Bureau)
- F. Heat-Reducing Engineering Controls

- G. Ventilation in place?
- H. Ventilation operating?
- I. Air conditioning in place?
- J. Air conditioning operating?
- K. Fans in place?
- L. Fans operating?
- M. Shields or insulation between sources and employees?
- N. Are reflective faces of shields clean?

WORK PRACTICES TO DETECT, EVALUATE, AND PREVENT OR REDUCE HEAT STRESS.

- A. Training program?
- B. Content?
- C. Where given?
- D. For whom?
- E. Liquid replacement program?
- F. Acclimatization program?
- G. Work/rest schedule?
- H. Scheduling of work (during cooler parts of shift, cleaning and maintenance during shut-downs, etc.)
- I. Cool rest areas (including shelter at outdoor work sites)?
- J. Heat monitoring program?
- K. Personal Protective Equipment
- L. Reflective clothing in use?
- M. Ice and/or water-cooled garments in use?
- N. Wetted undergarments (used with reflective or impermeable clothing) in use?
- O. Circulating air systems in use?
- P. First Aid Program
- Q. Trained personnel?
- R. Provision for rapid cool-down?
- S. Procedures for getting medical attention?
- T. Transportation to medical facilities readily available for heat stroke victims?
- U. Medical Screening and Surveillance Program
- V. Content?
- W. Who manages program?
- X. Additional Comments

(Use additional pages as needed.)

APPENDIX III: 4-2. HEAT STRESS-RELATED ILLNESS OR ACCIDENT FOLLOW-UP.

- A. Describe events leading up to the episode.
- B. Evaluation/comments by other workers at the scene.
- C. Work at time of episode (heavy, medium, light)?
- D. How long was affected employee working at site prior to episode?
- E. Medical history of affected worker, if known.
- F. Appropriate engineering controls in place?
- G. Appropriate engineering controls in operation?
- H. Appropriate work practices used by affected employee(s)?
- I. Appropriate personal protective equipment available?
- J. Appropriate personal protective equipment in use?
- K. Medical screening for heat stress and continued surveillance for signs of heat stress given other employees?
- L. Additional comments regarding specific episode(s): (Use additional pages as needed.)

APPENDIX III: 4-3. MEASUREMENT OF WET BULB GLOBE TEMPERATURE.

Measurement is often required of those environmental factors that most nearly correlate with deep body temperature and other physiological responses to heat. At the present time, the Wet Bulb Globe Temperature Index (WBGT) is the most used technique to measure these environmental factors. WBGT values are calculated by the following equations:

Equation III:4-4. Indoor or Outdoor Wet Bulb Globe Temperature Indexes (WBGI) Indoor or outdoors with no solar load

$$WBGT = 0.7NWB + 0.3GT$$

Outdoors with solar load

$$WBGT = 0.7NWB + 0.2GT + 0.1DB$$

where: WBGT = Wet Bulb Globe Temperature Index
 NWB = Natural Wet-Bulb Temperature
 DB = Dry-Bulb (air) Temperature
 GT = Globe Thermometer Temperature

The determination of WBGT requires the use of a black globe thermometer, a natural (static) wet-bulb thermometer, and a dry-bulb thermometer. The measurement of environmental factors shall be performed as follows:

1. The range of the dry and the natural wet-bulb thermometers should be -5°C to $+50^{\circ}\text{C}$, with an accuracy of $\pm 0.5^{\circ}\text{C}$. The dry bulb thermometer must be shielded from the sun and the other radiant surfaces of the environment without restricting the airflow around the bulb. The wick of the natural wet bulb thermometer should be kept wet with distilled water for at least one-half hour before the temperature reading is made. It is not enough to immerse the other end of the wick into a reservoir of distilled water and wait until the whole wick becomes wet by capillarity. The wick must be wetted by direct application of water from a syringe one-half hour before each reading. The wick must cover the bulb of the thermometer and an equal length of additional wick must cover the stem above the bulb. The wick should always be clean, and new wicks should be washed before using.
2. A globe thermometer, consisting of a 15 cm (6-inch) in diameter hollow copper sphere painted on the outside with a matte black finish, or equivalent, must be used. The bulb or sensor of a thermometer (range -5°C to $+100^{\circ}\text{C}$ with an accuracy of $\pm 0.5^{\circ}\text{C}$) must be fixed in the center of the sphere. The globe thermometer should be exposed at least 25 minutes before it is read.
3. A stand should be used to suspend the three thermometers so that they do not restrict free air flow around the bulbs and the wet-bulb and globe thermometer are not shaded.
4. It is permissible to use any other type of temperature sensor that gives a reading similar to that of a mercury thermometer under the same conditions.
5. The thermometers must be placed so that the readings are representative of the employee's work or rest areas, as appropriate.

Once the WBGT has been estimated, employers can estimate workers' metabolic heat load (see Tables III:4-1 and III:4-2) and use the ACGIH method to determine the appropriate work/rest regimen, clothing, and equipment to use to control the heat exposures of workers in their facilities.

[Freedom of Information Act](#) | [Privacy & Security Statement](#) | [Disclaimers](#) | [Customer Survey](#) | [Important Web Site Notices](#) | [International](#) | [Contact Us](#)

U.S. Department of Labor | Occupational Safety & Health Administration | 200 Constitution Ave., NW, Washington, DC 20210
Telephone: 800-321-OSHA (6742) | TTY: 877-889-5627

www.OSHA.gov

Health and Safety Briefing/
Tailgate Meeting Form

HEALTH AND SAFETY BRIEFING /
TAILGATE MEETING FORM

Site Name / Location _____

Date: _____ Weather Forecast: _____

Names of Personnel Attending Briefing

_____	_____	_____
_____	_____	_____
_____	_____	_____

Planned Work _____

Items Discussed _____

Work Permit Type and
Applicable Restrictions:

Signatures of Attending Personnel

_____	_____	_____
_____	_____	_____
_____	_____	_____

Medical Data Form



(Patient Must Present Photo ID at Time of Service)

Authorization for Examination or Treatment

Patient Name: _____ Social Security Number: _____

Employer: _____ Date of Birth: _____

Street Address: _____ Location Number: _____

Temporary Staffing Agency: _____

Work Related

Injury Illness

Date of Injury _____

Substance Abuse Testing* (check all that apply)

Regulated drug screen Breath alcohol

Collection only Hair collect

Non-regulated drug screen Rapid drug screen

Other _____

Type of Substance Abuse Testing

Preplacement Reasonable cause

Post-accident Random

Follow-up

Special instructions/comments: _____

Authorized by: _____

Please print

Phone: (_____) _____

Physical Examination

Preplacement Baseline Annual Exit

DOT Physical Examination

Preplacement Recertification

Special Examination

Asbestos Respirator Audiogram

Human Performance Evaluation*

HAZMAT Medical Surveillance

Other _____

Billing (check if applicable)

Employee to pay charges

★ Due to the nature of these specific services, only the patient and staff are allowed in the testing/treatment area. Please alert your employee so that they can make arrangements for children or others that might otherwise be accompanying them to the medical center.

Title: _____

Date

Concentra now offers urgent care services for non-work related illness and injury. We accept many insurance plans.

(Copies of this form are available at www.concentra.com)

Improving America's health, one patient at a time.

The Reason for Today's Visit

- Physical exam Drug Screen Physical and Drug Screen Injury
 DOT (CDL) certification Other: _____

Patient

Last name: _____ First name: _____ M.I.: _____
Social Security #: _____ Date of birth (MM/DD/YYYY): _____
Address: _____ Apt. # _____ City: _____ ST: _____ ZIP: _____
Contact phone (home or cell): _____ Work phone: _____ Female Male
Occupation _____ Single Married

Employer

Employer Requesting Services


Name: _____ Location/store number: _____
Contact name: _____ Contact phone: _____
Address: _____ City: _____ ST: _____ ZIP: _____
Is your employment arranged through a temporary hire agency? Yes No Name of agency: _____ Agency phone: _____

The information provided is correct to the best of my knowledge. I will not hold Concentra, its health providers, or its employees responsible for any errors or omissions that I may have made in completing the information on this form. You may contact my employer to verify the purpose of my visit, if necessary.

 Signature: _____ Date: _____

Notice of Privacy Practices

Your name and signature below indicate that you have received a copy of Concentra's Notice of Privacy Practices on the date and time indicated. If you have any questions regarding the information in Concentra's Notice of Privacy Practices, contact Concentra's Privacy Office at 800-819-5571 or PrivacyOffice@concentra.com.

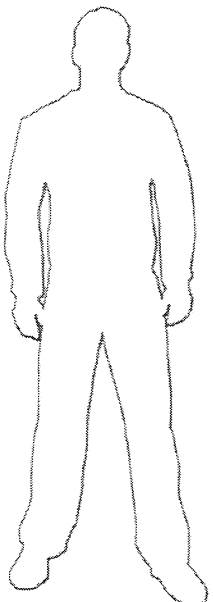
Name (please print): _____
 Signature: _____
Date and time Notice received: _____

If you are here for an injury, please complete the section below.

Injury date: _____ Injury time: _____
Where were you when the injury occurred?: _____

How did the injury happen? _____

What part of your body is injured? _____



Please check which side of your body is injured. Right Left Both
Using the figure at right, please circle the areas where you are injured. ➔

You may be contacted by Westgate Research, acting on behalf of Concentra, to participate in a satisfaction survey about this visit. We rely on your feedback to help us improve.

Mejorando la salud de los Estados Unidos, un paciente a la vez.

La razón para la consulta de hoy

- Examen físico Chequeo de drogas Examen físico y chequeo de drogas Lesión
 Certificación DOT (CDL) Otro: _____

Paciente
Apellido: _____ Nombre: _____ Inicial Seg. Nombre: _____
Seguro Social: _____ Fecha de Nacimiento (MM/DD/AAAA): _____
Dirección: _____ Apt. # _____ Ciudad: _____ Estado _____ Cód. Postal: _____
Teléfono de contacto (casa o celular): _____ Teléfono trabajo: _____ Mujer Hombre
Ocupación: _____ Soltero(a) Casado(a)

Empleador Solicitando los Servicios

Empleador
Nombre: _____ Ubicación/Tienda Número: _____
Nombre del Contacto: _____ Teléfono del Contacto: _____
Dirección: _____ Apt. # _____ Ciudad: _____ Estado _____ Cód. Postal: _____
¿Su empleo está contratado a través de una agencia de empleos temporales? Sí No
Nombre de la agencia: _____ Teléfono de la agencia: _____

La información provista es correcta hasta donde yo sé. Yo no haré responsable a Concentra, sus proveedores de la salud, o sus empleados por cualquier error u omisión que yo haya hecho al llenar la información en este formulario. Si es necesario, usted puede contactar a mi empleador para verificar el propósito de mi consulta.

 Firma: _____ Fecha: _____

Aviso de las Políticas de Privacidad

Su nombre y firma abajo indican que usted ha recibido una copia de la Notificación de Políticas de Privacidad de Concentra en la fecha y hora indicados. Si usted tiene cualquier pregunta en relación con la Notificación de Prácticas de Privacidad de Concentra, por favor contacte al Oficial de Privacidad y Seguridad de Concentra al 800-819-5571 o PrivacyOffice@concentra.com.

Nombre (letra imprenta por favor) _____

 Firma: _____

Fecha y hora de recibida la notificación: _____

Si usted está aquí por una lesión, por favor llenar la sección de abajo.

Fecha de la lesión: _____ Hora de la lesión: _____

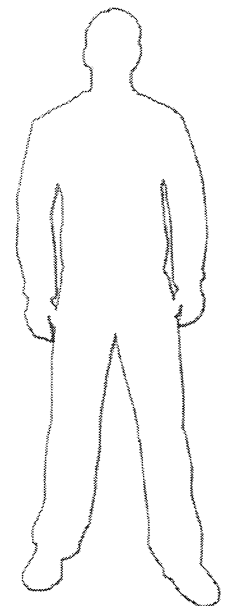
¿Dónde estaba cuando ocurrió la lesión? _____

¿Cómo ocurrió la lesión? _____

¿Qué parte de su cuerpo está lesionada? _____

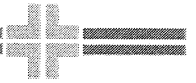
Por favor indique cuál lado de su cuerpo está lesionado Derecho Izquierdo Ambos
Utilizando el dibujo a la derecha, por favor marque con un círculo las áreas que están lesionadas ☺

Puede que lo contacte de Westgate Research, en representación de Concentra para que participe en una encuesta de satisfacción acerca de su consulta. Nosotros contamos con esta información, la cual nos ayuda a mejorar.



Patient Information

Concentra[®]
treated right



Thank you for trusting us with your care today.

Last name: _____ First name: _____ M.I.: _____
Patient SS #: _____ Date of Birth (MM/DD/YYYY): _____ Married
Home phone: _____ Cell phone: _____ Single
Reason for visit: _____ Male Female
Patient e-mail address: _____
Address: _____ Apt # _____ City: _____ ST: _____ ZIP: _____
Primary care physician name: _____ Phone: _____
Employer name: _____
Employer address: _____ City: _____ ST: _____ ZIP: _____
Emergency Contact Name: _____ Emergency Contact Phone: _____

How did you learn
about Concentra?
(Check one, please.)

- Billboard Direct mail Doctor referral Driving by Employer Existing patient Friend/relative
 Insurance company Internet Movie theater Newspaper Phone book Radio Pharmacy
 School Apartment Complex

Today's Payment

How will you
be paying for
today's bill?

Payment made today will be paid by:

- Patient Pay—I will be paying today using: Cash Check VISA MasterCard Discover Debit card
 My company—I am participating in a program that is company-paid.
 Insurance—I will present my insurance card and an approved form of ID. (Please complete next two sections.)

Insurance Information

If you're using
insurance to
pay today's bill,
please provide this
information...

Employer of insured person: _____
Insurance carrier: _____
Member ID: _____ Group #: _____
Claims address: _____ City: _____ ST: _____ ZIP: _____

Do you have insurance with more than one health plan? Yes No

If yes, name of other insurance carrier: _____

➔ (Please present both ID cards at check-in.)

Account Information

If you're using
insurance, this is
information about the
person carrying the
insurance...

Last name: _____ First name: _____ M.I.: _____
Account SS #: _____ Date of birth (MM/DD/YYYY): _____
Home phone: _____ Cell phone: _____
Address: _____ City: _____ ST: _____ ZIP: _____

Relationship to patient: (Check one, please.) Self Spouse Parent/Guardian Other: _____

I certify that the information provided is correct to the best of my knowledge. I will not hold Concentra, its health providers, or its employees responsible for any errors or omissions that I may have made in completing the information on this form.

You may be contacted by Westgate Research, acting on behalf of Concentra to participate in a satisfaction survey about this visit. We rely on your feedback to help us improve.

Signature: _____ Date: _____

Información Paciente

Concentra[®]
treated right



Gracias por confiarnos sus cuidados de hoy.

Apellido: _____ Nombre: _____ Inicial Segundo Nombre: _____
#SS del paciente: _____ Fecha de nacimiento (MM/DD/AAAA): _____ Casado(a)
Teléfono en casa: _____ Teléfono celular: _____ Soltero(a)
Motivo de la consulta: _____ Hombre Mujer
Correo electrónico del paciente: _____
Dirección: _____ Apt # _____ Ciudad: _____ Estado: _____ Cód. Postal: _____
Nombre del médico de atención primaria: _____ Teléfono: _____
Nombre del empleador: _____
Dirección del empleador: _____ Ciudad: _____ Estado: _____ Cód. Postal: _____
Contacto de Emergencia: _____ Teléfono de Contacto de Emergencia: _____

Cómo se enteró
de Concentra?
(Por favor marque una)

- Valla Correo Directo Remitido por un doctor Pasábarlos por aquí Empleador Paciente existente
 Amigo/pariente Compañía de seguro Internet Teatro de cine Periódico Radio Farmacia Escuela
 Complejo de Apartamentos

Pago de hoy
Cómo va a pagar
la cuenta de hoy?

El pago de hoy lo va a hacer:

- El paciente — Yo pagaré la cuenta total usando: Efectivo Cheque VISA MasterCard Discover Tarjeta Débito
 La Compañía paga - Estoy participando en un programa que es pagado por la Compañía
 El seguro — Yo presentaré mi tarjeta de seguro y una forma de identificación aprobada
(Por favor complete las siguientes dos secciones).

**Información
del seguro**
Si usted está usando
seguro para pagar
la cuenta de hoy,
por favor proveéanos
con la siguiente
información...

Empleador de la persona asegurada: _____
Compañía de seguro: _____
Identificación del Miembro: _____ # de Grupo: _____
Dirección de reclamos: _____ Ciudad: _____ Estado: _____ Cód. Postal: _____
Tiene seguro con más de un plan de salud? Sí No
Sí sí, nombre el otro seguro: _____
➔ (Por favor presente ambas tarjetas de identificación al registrarse)

**Información de
la cuenta**
Si usted está usando
seguro, esta es
información acerca de
la persona que tiene
el seguro...

Apellido: _____ Nombre: _____ Inicial Seg. Nombre: _____
de SS en la Cuenta: _____ Fecha de Nacimiento: (MM/DD/AAAA) _____
Teléfono en casa: _____ Teléfono celular: _____
Dirección: _____ Ciudad: _____ Estado: _____ Cód. Postal: _____
Relación con el paciente: Usted mismo Cónyuge Padre/Guardián Otro: _____
(Por favor marque una)

Yo certifico que la información provista es correcta hasta donde yo sé. Yo no haré responsable a Concentra, sus proveedores de la salud, o sus empleados por cualquier error u omisión que yo haya hecho al llenar la información en este formulario.

Firma: _____ Fecha: _____

Generic Community Air Monitoring Plan

APPENDIX G

New York State Department of Health Generic Community Air Monitoring Plan

Overview

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for VOCs and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate DEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing

monitoring wells. “Periodic” monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions, particularly if wind direction changes. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

1. If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.
2. If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.
3. If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.
4. All 15-minute readings must be recorded and be available for State (DEC and NYSDOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring

particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

1. If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed $150 \text{ mcg}/\text{m}^3$ above the upwind level and provided that no visible dust is migrating from the work area.
2. If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than $150 \text{ mcg}/\text{m}^3$ above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within $150 \text{ mcg}/\text{m}^3$ of the upwind level and in preventing visible dust migration.
3. All readings must be recorded and be available for State (DEC and NYSDOH) and County Health personnel to review.

Accident Report and Investigation Form

ACCIDENT REPORT

Joe Gentile, Corporate Health and Safety Manager

Cell: (610) 844-6911; Office: (856) 423-8800; Office FAX: (856) 423-3220; Home: (484) 373-0953

PART 1: ADMINISTRATIVE INFORMATION

Project #: _____ Project Name: _____ Project Location (street address/city/state): _____ _____ Client Corporate Name / Contact / Address / Phone #: _____ _____ _____ _____	Immediate Verbal Notifications Given To: Corporate Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Manager <input type="checkbox"/> Yes <input type="checkbox"/> No Project Principal <input type="checkbox"/> Yes <input type="checkbox"/> No Project Manager <input type="checkbox"/> Yes <input type="checkbox"/> No Client Contact <input type="checkbox"/> Yes <input type="checkbox"/> No	REPORT STATUS (time due): <input type="checkbox"/> Initial (24 hr) <input type="checkbox"/> Final (5-10 days) Date: _____ Date: _____ Accident Report Delivered To: Corporate Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Health & Safety <input type="checkbox"/> Yes <input type="checkbox"/> No Office Manager <input type="checkbox"/> Yes <input type="checkbox"/> No Project Principal <input type="checkbox"/> Yes <input type="checkbox"/> No Project Manager <input type="checkbox"/> Yes <input type="checkbox"/> No
OSHA CASE # Assigned by Corporate Health & Safety if Applicable: _____		Corporate Health & Safety Confirmed Final Accident Report <input type="checkbox"/> Yes <input type="checkbox"/> No
DATE OF INCIDENT: _____	TIME INCIDENT OCCURRED: _____ <input type="checkbox"/> AM <input type="checkbox"/> PM	INCIDENT LOCATION – City, State, and Country (If outside U.S.A.) _____

INCIDENT TYPES: (Select most appropriate if Loss occurred.)
 From lists below, please select the option that best categories the incident. When selecting an injury or illness, also indicate the severity level.

<input type="checkbox"/> INJURY -----Severity Level----- <input type="checkbox"/> Fatality <input type="checkbox"/> First Aid <input type="checkbox"/> Medical <input type="checkbox"/> Restricted Work <input type="checkbox"/> Lost Time Treatment	<input type="checkbox"/> ILLNESS <input type="checkbox"/> Spill / Release Material involved: _____ Quantity (U.S. Gallons): _____	<input type="checkbox"/> OTHER INCIDENT TYPES <input type="checkbox"/> Misdirected Waste <input type="checkbox"/> Consent Order <input type="checkbox"/> NOV <input type="checkbox"/> Property Damage <input type="checkbox"/> Exceedance <input type="checkbox"/> Motor Vehicle <input type="checkbox"/> Fine / Penalty
---	---	--

ACTIVITY TYPE (Check most appropriate one.) <input type="checkbox"/> Decommissioning <input type="checkbox"/> Geoprobe <input type="checkbox"/> Sampling <input type="checkbox"/> Demolition <input type="checkbox"/> Motor Vehicle <input type="checkbox"/> System Start-up <input type="checkbox"/> Dewatering <input type="checkbox"/> Operations/ Maintenance <input type="checkbox"/> Trenching <input type="checkbox"/> Drilling <input type="checkbox"/> AST/UST Removal <input type="checkbox"/> Excavation <input type="checkbox"/> Pump/Pilot Test <input type="checkbox"/> Other _____ <input type="checkbox"/> Gauging <input type="checkbox"/> Rigging/Lifting	INJURY TYPE (Check all applicable.) <input type="checkbox"/> Abrasion <input type="checkbox"/> Occupational Illness <input type="checkbox"/> Amputation <input type="checkbox"/> Puncture <input type="checkbox"/> Burn <input type="checkbox"/> Rash <input type="checkbox"/> Cold/Heat Stress <input type="checkbox"/> Repetitive Motion <input type="checkbox"/> Inflammation <input type="checkbox"/> Sprain/Strain <input type="checkbox"/> Laceration <input type="checkbox"/> Other _____	BODY PART AFFECTED (Check all applicable.) <input type="checkbox"/> Respiratory <input type="checkbox"/> Shoulder <input type="checkbox"/> Face <input type="checkbox"/> Neck <input type="checkbox"/> Arm <input type="checkbox"/> Leg <input type="checkbox"/> Chest <input type="checkbox"/> Wrist <input type="checkbox"/> Knee <input type="checkbox"/> Abdomen <input type="checkbox"/> Hand/Fingers <input type="checkbox"/> Ankle <input type="checkbox"/> Groin <input type="checkbox"/> Eye <input type="checkbox"/> Foot/Toes <input type="checkbox"/> Back <input type="checkbox"/> Head <input type="checkbox"/> Other _____
---	---	--

I. PERSON(S) DIRECTLY / INDIRECTLY INVOLVED IN INCIDENT (Attach additional information as necessary/applicable.)

Name/Phone # of Each Person Directly/Indirectly Involved in Incident:	Designate: Roux/Remedial Employee Roux/Remedial Subcontractor Client Employee Client Contractor Third Party	As applicable, Current Occupation; Yrs in Current Occupation; Current Position; and Yrs in Current Position:	As applicable, Employer Name; Address; and Phone #.	As applicable, Supervisor Name; and Phone #:
1)				
2)				

II. PERSONS INJURED IN INCIDENT (Attach additional information as necessary/applicable.)

Name/Phone # of Each Person Injured in Incident:	Designate: Roux/Remedial Employee Roux/Remedial Subcontractor Client Employee Client Contractor Third Party	As applicable, Current Occupation; Yrs in Current Occupation; Current Position; and Yrs in Current Position:	As applicable, Employer Name; Address; and Phone #.	As applicable, Supervisor Name; and Phone #:	Description of Injury:
1)					
2)					

III. PROPERTY DAMAGED IN INCIDENT (Attach additional information as necessary/applicable.)

Property Damaged:	Property Location:	Owner Name, Address & Phone #:	Description of Damage:	Estimated Cost:
1)				\$

Accident Report – Page 2

2)				\$
----	--	--	--	----

IV. WITNESSES TO INCIDENT (Attach additional information as necessary/applicable.)

Witness Name:	Address:	Phone #:
1)		
2)		

PART 2: WHAT HAPPENED AND INCIDENT DETAILS

PROVIDE FACTUAL DESCRIPTION OF INCIDENT (e.g., describe loss/near loss, injury, response / treatment).

I. AUTHORITIES/GOVERNMENTAL AGENCIES NOTIFIED (Attach additional information as necessary/applicable.)

Authority/Agency Notified:	Name/Phone #/Fax # of Person Notified:	Address of Person Notified:	Date & Time of Notification:	Exact Information Reported/Provided:

II. PUBLIC RESPONSES TO INCIDENT (if applicable)

Response/Inquiry By: (check one)	Entity Name:	Name/Phone # of Respondent/ Inquirer:	Address of Entity/Person:	Date & Time of Response/Inquiry:
<input type="checkbox"/> Newspaper <input type="checkbox"/> Television <input type="checkbox"/> Community Group <input type="checkbox"/> Neighbors <input type="checkbox"/> Other				

Describe Response/Inquiry:

Roux/Remedial Response:

(Check all that apply.) (Attach photos, drawings, etc. to help illustrate the incident.)

ATTACHED INFORMATION: Photo Sketches Vehicle Acord Form Police Report Other

Name(s) of person(s) who prepared Initial and Final Report:	Title(s):	Phone number(s):

PART 3: INVESTIGATION TEAM ANALYSIS

CONCLUSION: WHY IT HAPPENED (LIST CAUSAL FACTORS AND CORRESPONDING ROOT CAUSES)

(Root Causes: Lack of knowledge or skill, Doing the task according to procedures or acceptable practices takes more time or effort, Short-cuts or not following acceptable practices is reinforced or tolerated, Not following procedures or acceptable practices did not result in an accident, Lack of or inadequate procedures, Inadequate communications of expectations regarding procedures or acceptable practices, Inadequate tools or equipment, External Factors)

ROOT CAUSE(S) AND SOLUTION(S): HOW TO PREVENT INCIDENT FROM RECURRING

CAUSAL FACTOR	ROOT CAUSE	SOLUTION(S) [Must Match Root Cause(s)]		PERSON RESPONSIBLE	AGREED DUE DATE	ACTUAL COMPLETION DATE
		#	Solution(s)			
		1				
		2				
		3				

INVESTIGATION TEAM:

PRINT NAME	JOB POSITION	DATE	SIGNATURE

No One Gets Hurt!

Acord Automobile Loss Form



AUTOMOBILE LOSS NOTICE

DATE (MM/DD/YYYY)

AGENCY AJ Gallagher Risk Management Services 377 Oak Street Garden City, NY 11530		INSURED LOCATION CODE	DATE OF LOSS AND TIME AM PM
CONTACT NAME Teresa Garza PHONE (AG, No, Ext): 616.622.2418 FAX (AG, No): E-MAIL ADDRESS: CODE: SUBCODE:		CARRIER Great Divide Insurance Company	NAIC CODE 25224
AGENCY CUSTOMER ID: ROUXASS-01		POLICY NUMBER BAP154979912	
		POLICY TYPE Commercial Automobile	

INSURED NAME OF INSURED (First, Middle, Last) Roux Associates, Inc.			INSURED'S MAILING ADDRESS 209 Shafter Street Islandia, NY 11749
DATE OF BIRTH	FEIN (if applicable) 11-2579482	MARITAL STATUS / CIVIL UNION (if applicable)	
PRIMARY PHONE # <input type="checkbox"/> HOME <input checked="" type="checkbox"/> BUS <input type="checkbox"/> CELL 631.232.2600	SECONDARY PHONE # <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	PRIMARY E-MAIL ADDRESS: legaldept@rouxinc.com SECONDARY E-MAIL ADDRESS: Fax Notice of Loss to: 631.232.1525	

CONTACT CONTACT INSURED		CONTACT'S MAILING ADDRESS Cindy Albanese 209 Shafter Street Islandia, NY 11749	
NAME OF CONTACT (First, Middle, Last) Cindy Albanese		PRIMARY E-MAIL ADDRESS: legaldept@rouxinc.com SECONDARY E-MAIL ADDRESS: Fax Notice of Loss to 631.232.1525	
PRIMARY PHONE # <input type="checkbox"/> HOME <input checked="" type="checkbox"/> BUS <input type="checkbox"/> CELL	SECONDARY PHONE # <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	WHEN TO CONTACT	

LOSS LOCATION OF LOSS STREET: CITY, STATE, ZIP: COUNTRY:		POLICE OR FIRE DEPARTMENT CONTACTED REPORT NUMBER
DESCRIBE LOCATION OF LOSS IF NOT AT SPECIFIC STREET ADDRESS: DESCRIPTION OF ACCIDENT (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)		

INSURED VEHICLE		VEH # YEAR MAKE MODEL: BODY TYPE V.I.N.: PLATE NUMBER STATE	
OWNER'S NAME AND ADDRESS <input type="checkbox"/> (Check if same as insured)		PRIMARY PHONE # <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	SECONDARY PHONE # <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL
DRIVER'S NAME AND ADDRESS <input type="checkbox"/> (Check if same as owner)		PRIMARY PHONE # <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	SECONDARY PHONE # <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL
RELATION TO INSURED (Employee, family, etc.)	DATE OF BIRTH	DRIVER'S LICENSE NUMBER	STATE PURPOSE OF USE USED WITH PERMISSION? (Y/N)
DESCRIBE DAMAGE			
1. WAS A STANDARD CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) INSTALLED IN THE VEHICLE AT THE TIME OF THE ACCIDENT?			Y/N
2. WAS THE CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) IN USE BY A CHILD DURING THE TIME OF THE ACCIDENT?			Y/N
3. DID THE CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) SUSTAIN A LOSS AT THE TIME OF THE ACCIDENT?			Y/N
ESTIMATE AMOUNT:		WHERE CAN VEHICLE BE SEEN?:	WHEN CAN VEHICLE BE SEEN?:
OTHER INSURANCE ON VEHICLE - CARRIER:		POLICY NUMBER:	

OTHER VEHICLE / PROPERTY DAMAGED NON - VEHICLE?

AGENCY CUSTOMER ID: _____

VEH #	YEAR	MAKE: MODEL:	BODY TYPE: VIN:	PLATE NUMBER	STATE
DESCRIBE PROPERTY (Other Than Vehicle)					OTHER VEH/PROP INS? (Y/N) <input type="checkbox"/>
CARRIER OR AGENCY NAME		NAIC CODE	POLICY NUMBER		
OWNER'S NAME AND ADDRESS			PRIMARY PHONE #	<input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	
			SECONDARY PHONE #	<input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	
DRIVER'S NAME AND ADDRESS <input type="checkbox"/> (Check if same as owner)			PRIMARY E-MAIL ADDRESS:		
			SECONDARY E-MAIL ADDRESS:		
			PRIMARY PHONE #	<input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	
			SECONDARY PHONE #	<input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	
			PRIMARY E-MAIL ADDRESS:		
			SECONDARY E-MAIL ADDRESS:		
DESCRIBE DAMAGE					
ESTIMATE AMOUNT		WHERE CAN DAMAGE BE SEEN?			

INJURED

NAME & ADDRESS	PHONE (A/C, No)	PED	INS VEH	OTH VEH	AGE	EXTENT OF INJURY
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		
		<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>		

WITNESSES OR PASSENGERS

NAME & ADDRESS	PHONE (A/C, No)	INS VEH	OTH VEH	OTHER (Specify)
		<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	
		<input type="checkbox"/>	<input type="checkbox"/>	

REPORTED BY	REPORTED TO
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REMARKS (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)

APPLICABLE IN ALABAMA

Any person who knowingly presents a false or fraudulent claim for payment of a loss or benefit or who knowingly presents false information in an application for insurance is guilty of a crime and may be subject to restitution fines or confinement in prison, or any combination thereof.

APPLICABLE IN ALASKA

A person who knowingly and with intent to injure, defraud, or deceive an insurance company files a claim containing false, incomplete, or misleading information may be prosecuted under state law.

APPLICABLE IN ARIZONA

For your protection, Arizona law requires the following statement to appear on this form. Any person who knowingly presents a false or fraudulent claim for payment of a loss is subject to criminal and civil penalties.

**APPLICABLE IN ARKANSAS, DELAWARE, KENTUCKY, LOUISIANA, MAINE, MICHIGAN, NEW JERSEY,
NEW MEXICO, NORTH DAKOTA, PENNSYLVANIA, RHODE ISLAND, SOUTH DAKOTA, TENNESSEE,
TEXAS, VIRGINIA, AND WEST VIRGINIA**

Any person who knowingly and with intent to defraud any insurance company or another person, files a statement of claim containing any materially false information, or conceals for the purpose of misleading, information concerning any fact, material thereto, commits a fraudulent insurance act, which is a crime, subject to criminal prosecution and civil penalties. In LA, ME, TN, and VA, insurance benefits may also be denied.

APPLICABLE IN CALIFORNIA

For your protection, California law requires the following to appear on this form: Any person who knowingly presents a false or fraudulent claim for payment of a loss is guilty of a crime and may be subject to fines and confinement in state prison.

APPLICABLE IN COLORADO

It is unlawful to knowingly provide false, incomplete, or misleading facts or information to an insurance company for the purpose of defrauding or attempting to defraud the company. Penalties may include imprisonment, fines, denial of insurance, and civil damages. Any insurance company or agent of an insurance company who knowingly provides false, incomplete, or misleading facts or information to a policy holder or claimant for the purpose of defrauding or attempting to defraud the policy holder or claimant with regard to a settlement or award payable from insurance proceeds shall be reported to the Colorado Division of Insurance within the Department of Regulatory Agencies.

APPLICABLE IN THE DISTRICT OF COLUMBIA

Warning: It is a crime to provide false or misleading information to an insurer for the purpose of defrauding the insurer or any other person. Penalties include imprisonment and/or fines. In addition, an insurer may deny insurance benefits, if false information materially related to a claim was provided by the applicant.

APPLICABLE IN FLORIDA

Pursuant to S. 817.234, Florida Statutes, any person who, with the intent to injure, defraud, or deceive any insurer or insured, prepares, presents, or causes to be presented a proof of loss or estimate of cost or repair of damaged property in support of a claim under an insurance policy knowing that the proof of loss or estimate of claim or repairs contains any false, incomplete, or misleading information concerning any fact or thing material to the claim commits a felony of the third degree, punishable as provided in S. 775.082, S. 775.083, or S. 775.084, Florida Statutes.

APPLICABLE IN HAWAII

For your protection, Hawaii law requires you to be informed that presenting a fraudulent claim for payment of a loss or benefit is a crime punishable by fines or imprisonment, or both.

APPLICABLE IN IDAHO

Any person who knowingly and with the intent to injure, defraud, or deceive any insurance company files a statement of claim containing any false, incomplete or misleading information is guilty of a felony.

APPLICABLE IN INDIANA

A person who knowingly and with intent to defraud an insurer files a statement of claim containing any false, incomplete, or misleading information commits a felony.

APPLICABLE IN KANSAS

Any person who, knowingly and with intent to defraud, presents, causes to be presented or prepares with knowledge or belief that it will be presented to or by an insurer, purported insurer, broker or any agent thereof, any written statement as part of, or in support of, an application for the issuance of, or the rating of an insurance policy for personal or commercial insurance, or a claim for payment or other benefit pursuant to an insurance policy for commercial or personal insurance which such person knows to contain materially false information concerning any fact material thereto; or conceals, for the purpose of misleading, information concerning any fact material thereto commits a fraudulent insurance act.

APPLICABLE IN MARYLAND

Any person who knowingly or willfully presents a false or fraudulent claim for payment of a loss or benefit or who knowingly or willfully presents false information in an application for insurance is guilty of a crime and may be subject to fines and confinement in prison.

APPLICABLE IN MINNESOTA

A person who files a claim with intent to defraud or helps commit a fraud against an insurer is guilty of a crime.

APPLICABLE IN NEVADA

Pursuant to NRS 686A.291, any person who knowingly and willfully files a statement of claim that contains any false, incomplete or misleading information concerning a material fact is guilty of a felony.

APPLICABLE IN NEW HAMPSHIRE

Any person who, with purpose to injure, defraud or deceive any insurance company, files a statement of claim containing any false, incomplete or misleading information is subject to prosecution and punishment for insurance fraud, as provided in RSA 638:20.

APPLICABLE IN NEW YORK

Any person who knowingly and with intent to defraud any insurance company or other person files an application for commercial insurance or a statement of claim for any commercial or personal insurance benefits containing any materially false information, or conceals for the purpose of misleading, information concerning any fact material thereto, and any person who in connection with such application or claim knowingly makes or knowingly assists, abets, solicits or conspires with another to make a false report of the theft, destruction, damage or conversion of any motor vehicle to a law enforcement agency, the Department of Motor Vehicles or an insurance company, commits a fraudulent insurance act, which is a crime, and shall also be subject to a civil penalty not to exceed five thousand dollars and the value of the subject motor vehicle or stated claim for each violation.

APPLICABLE IN OHIO

Any person who, with intent to defraud or knowing that he/she is facilitating a fraud against an insurer, submits an application or files a claim containing a false or deceptive statement is guilty of insurance fraud.

APPLICABLE IN OKLAHOMA

WARNING: Any person who knowingly and with intent to injure, defraud or deceive any insurer, makes any claim for the proceeds of an insurance policy containing any false, incomplete or misleading information is guilty of a felony.

APPLICABLE IN WASHINGTON

It is a crime to knowingly provide false, incomplete, or misleading information to an insurance company for the purpose of defrauding the company. Penalties include imprisonment, fines and denial of insurance benefits.

Near Loss Reporting Form

Roux Associates, Inc. Remedial Engineering, P.C.
 (Check applicable company name)

PART 1: ADMINISTRATIVE INFORMATION	
Office: <input type="checkbox"/> New York <input type="checkbox"/> Massachusetts <input type="checkbox"/> New Jersey <input type="checkbox"/> Illinois <input type="checkbox"/> CA - Los Angeles <input type="checkbox"/> CA - San Francisco	
Project Manager:	Project Principal:
Project Name:	Project Location:

PART 2: LESSONS LEARNED INCIDENT DETAILS	
Date\Time Occurred (MM/DD/YYYY HH:MM):	Date\Time Submitted (MM/DD/YYYY HH:MM):
LESSONS LEARNED INCIDENT TYPE - What could have happened? - Select all that apply (1-7)	
1. <input type="checkbox"/> Fire / Explosion	3. <input type="checkbox"/> Security (e.g, theft, trespassing, vandalism)
2. <input type="checkbox"/> Injury / Illness	4. <input type="checkbox"/> Environmental (spill, permit exceedance, etc.)
	5. <input type="checkbox"/> Transportation of personnel (vehicle accident)
	6. <input type="checkbox"/> Property/Equipment Damage
	7. <input type="checkbox"/> Business Interruption
Event Leading to Potential Injury/Illness:	
Job Task*:	Equipment Involved*:

WHAT HAPPENED? Do not include individuals' names. Ensure photos, sketches, etc. are not personally identifiable unless written consent has been obtained.

Summary (1-2 sentences. Provide brief description of the incident. Provide facts only, no speculation or opinion):

Incident Details (Brief factual details of what, where, when; include photos, sketches, etc. as attachments):

Immediate Corrective Actions Taken:

SERIOUS INJURY OR FATALITY (SIF): IF AN ACTUAL SIF, USE EXISTING ROUX ACCIDENT REPORTING FORM	
Could this have resulted in a SIF? <input type="checkbox"/> Yes <input type="checkbox"/> No	
A potential SIF is defined as likely to have caused an injury resulting in significant physical body damage with probable long term and/or life altering complications.	

INCIDENT INVOLVED:			
Roux Employee:	<input type="checkbox"/> Yes <input type="checkbox"/> No	Subcontractor Company Name:	
INVESTIGATION TEAM			
NAME	JOB TITLE	NAME	JOB TITLE

PART 3: INCIDENT INVESTIGATION FINDINGS AND REPORT QUALITY REVIEW	
Date Investigation Team Assigned (mm/dd/yyyy):	
INVESTIGATION SUMMARY: Determine from list below what behaviors and/or conditions may have contributed to the H&S Lessons Learned Incident. Then, use the "Multiple-Why Technique" for each of these behaviors/conditions; provide a narrative for each that explains how the associated Root Cause(s) was determined. Do not include individuals' names.	

ROOT CAUSES: HOW TO REDUCE POSSIBILITY OF INCIDENT RECURRING	
Selection of RCs and solutions reflects the analysis of investigation team. It is not meant as a legally binding conclusion as to causal factors and/or solutions.	
PERSONAL FACTORS: A. LACK OF SKILL OR KNOWLEDGE B. DOING THE JOB ACCORDING TO PROCEDURES OR ACCEPTABLE PRACTICES TAKES MORE TIME OR EFFORT C. SHORT-CUTTING PROCEDURES OR ACCEPTABLE PRACTICES IS POSITIVELY REINFORCED OR TOLERATED D. IN PAST, DID NOT FOLLOW PROCEDURES OR ACCEPTABLE PRACTICES AND NO INCIDENT OCCURRED	JOB FACTORS: E. LACK OF OR INADEQUATE PROCEDURES F. INADEQUATE COMMUNICATION OF EXPECTATIONS REGARDING PROCEDURES OR ACCEPTABLE STANDARDS G. INADEQUATE TOOLS OR EQUIPMENT (available, maintained, etc.)

Behavior / Condition	Root Cause	Solution(s) (Must Match Root Cause)	Person Responsible for	Completion Target Date	Completion Actual Date
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			Completion		

QUALITY REVIEW Correct root cause(s) identified? Do root cause(s) and solution(s) match? Are solution(s) feasible / maintainable?

Name:

Job Title:

PART 4: Date Solutions were Implemented & Validated (Were Solutions Effective?)

Date	Solution	Verifier / Validator Name and Job Title	Details (of I & V performed)

JOB TASK - Select the most appropriate one (primary job associated with incident-related work activity, avoid "Other" if possible)

- | | | | |
|----------------------------|---|--------------------------|--|
| 1. Carbon Change | 7. Gauging | 12. Pavement Cutting | 18. System Startup |
| 2. Construction | 8. Geoprobe / Direct Push | 13. Pump Test | 19. UST Removal (includes exposure and backfill) |
| 3. Demolition | 9. Mobil Remediation (includes vacuum event and chemical injection) | 14. Sampling | 20. Waste Management |
| 4. Dewatering | 10. NAPL Recovery | 15. Site Visit / Survey | 21. Well Abandonment |
| 5. Drilling (well install) | 11. O&M (remediation system) | 16. Subsurface Clearance | 22. Other: |
| 6. Excavation / Trenching | | 17. System Install | |

EQUIPMENT INVOLVED THAT CONTRIBUTED TO H&S LESSONS LEARNED - Select all that apply

- | | | | | |
|--------------------------------|-----------------------------|------------------------------------|--|------------------------------------|
| 1. Air Stripper | 25. Fire Extinguisher | 51. Maintenance Tool, General | 77. Safety Shoes / Boots | 98. Vapor Extraction System |
| 2. API Separator | 26. Forklift | 52. Manifold | 78. Safety Vest / Clothing | 99. Vapor-Phase Treatment System |
| 3. Automobile | 27. Front End Loader | 53. Manlift/Basket/Cherry Picker | 79. Rope | 100. Other System, Type: _____ |
| 4. Boom Material | 28. Grader | 54. Motor, Electric | 80. Bailer | 101. Surge Tank |
| 5. Bulldozer | 29. Hammer | 55. Oxidizer | 81. Geoprobe | 102. Underground Tank |
| 6. Cable | 30. Knife | 56. Pallet | 82. Hand Auger | 103. Telemetry System |
| 7. Carbon Drum / Vessel | 31. Non-Powered Equipment | 57. Piping | 83. PID | 104. Testing Devices |
| 8. Chain Block | 32. Powered Equipment | 58. Piping, Hose | 84. Multi-Gas Meter | 105. Tractor Trailer |
| 9. Compressor, Air | 33. Drill | 59. Piping, Injection/Mixing Point | 85. Sample Container | 106. Truck, Flatbed |
| 10. Control Panel (local) | 34. Grinder | 60. Hydrojet | 86. Split-Spoon Sampler | 107. Truck, Pickup |
| 11. Crane (mobile) | 35. Hydraulic Torque Wrench | 61. Centrifugal Pump | 87. Sling | 108. Truck, Tank Truck |
| 12. Drill Rig | 36. Powered Saw | 62. Diaphragm Pump | 88. Snow Blower | 109. Truck, Vacuum |
| 13. Drilling Equipment, Vacuum | 37. Impact Wrench | 63. Reciprocating Pump | 89. Snow Plow | 110. Safety Valve |
| 14. Drum, Vertical | 38. Saw | 64. Regenerative Pump | 90. Space Heater | 111. Block Valve |
| 15. Dump Truck | 39. Screwdriver | 65. Rotary Pump | 91. Air Sparging System | 112. Extraction Well |
| 16. Electric Heater | 40. Shears | 66. Transfer Pump | 92. Carbon Treatment System | 113. Monitoring Well |
| 17. Electrical Power Supply | 41. Shovel | 67. Submersible Pump | 93. Chemical Oxidation System | 114. Recovery Well |
| 18. Engine, Combustion | 42. Snip | 68. Face Shield | 94. Dual Phase Product Recovery System | 115. Winch |
| 19. Equipment Safety Grounding | 43. Wrench | 69. Fall Protection | 95. Groundwater Pump and Treat System | 116. Wire Rope |
| 20. Excavator / Power Shovel | 44. Hoist | 70. Gloves | 96. POET System | 117. No Equipment Involved |
| 21. Exclusion Zone Equipment | 45. Hook/Clamp/Buckle, etc. | 71. Hard Hat / Helmet | 97. Shed or Trailer | 118. MPT - Traffic Control Devices |
| 22. Fan / Blower | 46. Jack | 72. Hearing Protection | | 119. Not in List (describe): _____ |
| 23. Fencing | 47. Ladder, Extension | 73. Respiratory PPE (Chemical) | | |
| 24. Filter | 48. Ladder, Platform | 74. Respiratory PPE (Particulate) | | |
| | 49. Ladder, Step | 75. Safety Glasses | | |
| | 50. Lock Out / Tag Out | 76. Safety Goggles | | |

OSHA Log of
Occupational Injuries and Illnesses

Log of Work-Related Injuries and Illnesses

Attention: This form contains information relating to employee health and must be used in a manner that protects the confidentiality of employees to the extent possible while the information is being used for occupational safety and health purposes.

Form approved OMB no. 1218-0176

You must record information about every work-related death and about every work-related injury or illness that involves loss of consciousness, restricted work activity or job transfer, days away from work, or medical treatment beyond first aid. You must also record significant work-related injuries and illnesses that are diagnosed by a physician or licensed health care professional. You must also record work-related injuries and illnesses that meet any of the specific recording criteria listed in 29 CFR Part 1904.8 through 1904.12. Feel free to use two lines for a single case if you need to. You must complete an Injury and Illness Incident Report (OSHA Form 301) or equivalent form for each injury or illness recorded on this form. If you're not sure whether a case is recordable, call your local OSHA office for help.

Establishment name _____
 City _____ State _____

Identify the person			Describe the case			Classify the case				Enter the number of days the injured or ill worker was:		Check the "Injury" column or choose one type of illness:						
(A) Case no.	(B) Employee's name	(C) Job title <i>(e.g., Welder)</i>	(D) Date of injury or onset of illness	(E) Where the event occurred <i>(e.g., Loading dock north end)</i>	(F) Describe injury or illness, parts of body affected, and object/substance that directly injured or made person ill <i>(e.g., Second degree burns on right forearm from acetylene torch)</i>	CHECK ONLY ONE box for each case based on the most serious outcome for that case:				Away from work	On job transfer or restriction	(M) Injury (1) (2) (3) (4) (5) (6)						
						Death (G)	Days away from work (H)	Job transfer or restriction (I)	Other recordable cases (J)	(K)	(L)	Injury (1)	Skin disorder (2)	Respiratory condition (3)	Poisoning (4)	Hearing loss (5)	All other illnesses (6)	
						Remained at Work												
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
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			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
			/ / month/day			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Page totals ➤										days	days	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	

Public reporting burden for this collection of information is estimated to average 14 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Be sure to transfer these totals to the Summary page (Form 300A) before you post it.

Injury	Skin disorder	Respiratory condition	Poisoning	Hearing loss	All other illnesses
(1)	(2)	(3)	(4)	(5)	(6)

Summary of Work-Related Injuries and Illnesses



All establishments covered by Part 1904 must complete this Summary page, even if no work-related injuries or illnesses occurred during the year. Remember to review the Log to verify that the entries are complete and accurate before completing this summary.

Using the Log, count the individual entries you made for each category. Then write the totals below, making sure you've added the entries from every page of the Log. If you had no cases, write "0."

Employees, former employees, and their representatives have the right to review the OSHA Form 300 in its entirety. They also have limited access to the OSHA Form 301 or its equivalent. See 29 CFR Part 1904.35, in OSHA's recordkeeping rule, for further details on the access provisions for these forms.

Number of Cases

Total number of deaths	Total number of cases with days away from work	Total number of cases with job transfer or restriction	Total number of other recordable cases
_____	_____	_____	_____
(G)	(H)	(I)	(J)

Number of Days

Total number of days away from work	Total number of days of job transfer or restriction
_____	_____
(K)	(L)

Injury and Illness Types

Total number of . . . (M)	
(1) Injuries _____	(4) Poisonings _____
(2) Skin disorders _____	(5) Hearing loss _____
(3) Respiratory conditions _____	(6) All other illnesses _____

Post this Summary page from February 1 to April 30 of the year following the year covered by the form.

Public reporting burden for this collection of information is estimated to average 58 minutes per response, including time to review the instructions, search and gather the data needed, and complete and review the collection of information. Persons are not required to respond to the collection of information unless it displays a currently valid OMB control number. If you have any comments about these estimates or any other aspects of this data collection, contact: US Department of Labor, OSHA Office of Statistical Analysis, Room N-3644, 200 Constitution Avenue, NW, Washington, DC 20210. Do not send the completed forms to this office.

Establishment information

Your establishment name _____

Street _____

City _____ State _____ ZIP _____

Industry description (e.g., *Manufacture of motor truck trailers*)

Standard Industrial Classification (SIC), if known (e.g., 3715)

OR

North American Industrial Classification (NAICS), if known (e.g., 336212)

Employment information (If you don't have these figures, see the Worksheet on the back of this page to estimate.)

Annual average number of employees _____

Total hours worked by all employees last year _____

Sign here

Knowingly falsifying this document may result in a fine.

I certify that I have examined this document and that to the best of my knowledge the entries are true, accurate, and complete.

Company executive _____ Title _____

() - / /
 Phone Date