



# Interim Remedial Measure (IRM) Work Plan

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Morton Village Plaza Shopping Center  
1022 Old Country Road  
Plainview, New York  
Site Number: 130201

June 29, 2018

Prepared for:

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1. Air and Soil Vapor Results

# 1. Introduction

Roux Environmental Engineering and Geology, D.P.C. (Roux), has prepared this Interim Remedial Measure (IRM) Work Plan on behalf of Morton Village Realty Co., Inc. (Morton Village) to detail the scope of work for the installation of an active sub-slab depressurization system (SSDS) beneath portions of the existing building located at the Morton Village Plaza shopping center (Shopping Center), 998-1064 Old Country Road, Plainview, New York (Site). The Site location map is provided as Figure 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 SSDS is being installed to address soil vapor intrusion of chlorinated volatile organic compounds (CVOCs) documented to be present in soil vapor beneath portions of the Site and indoor air in the basements of several tenant spaces. The soil vapor and indoor air impacts do not extend across the entire Shopping Center. The extent of impacts exceeding applicable criteria (discussed in Section 2.0), is shown on Plate 1. The observed impacts are likely due to undocumented releases of dry cleaning chemicals from the Morton Village Cleaners, a/k/a Classic French Cleaners, (former Cleaners) tenant space (1022 Old Country Road – currently occupied by a Subway restaurant).

This IRM Work Plan has been prepared in accordance with New York State Department of Environmental Conservation (NYSDEC) procedures set forth in the document titled DER-10 Technical Guidance for Site Investigation and Remediation, dated May 2010, and complies with all applicable Federal, State and local laws, regulations and requirements.

## 1.1 Objectives and Scope of the IRM Work Plan

The proposed IRM will retrofit portions of the existing Shopping Center building, shown on Figure 2, with an SSDS capable of creating a negative pressure under the building and collecting potentially contaminated vapor for subsequent discharge to the atmosphere above the roof of the Site building. This IRM is a component of the overall investigation and remediation of the Site. It will address soil vapor intrusion issues. Additional remedial measures may be required based upon the results of a Remedial Investigation/Feasibility Study (RI/FS) currently being conducted for the Site, which will be submitted separately.

The remainder of this IRM Work Plan is organized as follows:

- Section 2: Site Background
- Section 3: Scope of Work
- Section 4: Soils/Materials Management Plan
- Section 5: Reporting
- Section 6: IRM Work Plan Implementation Schedule



## 1.2 Certification


I, Noelle Clarke, certify that I am currently a New York State registered professional engineer as defined in 6 NYCRR Part 375 and that this Interim Remedial Measure Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER-10.

Noelle Clarke

NYS Professional Engineer # 072491

6/29/2018

Date



Signature

## 2. Site Background

This section provides relevant Site background information.

### 2.1 Site Description and History

Property Location	
Property Name:	Morton Village Plaza
Property Description:	The property is occupied by Morton Village Plaza 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, and restaurants. 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 Information	
Property Acreage:	9.936 acres (total)
Property Shape:	Rectangular
Property Use:	The property is currently occupied by various professional businesses, retail stores, and restaurants.
Number of Buildings:	Four
Number of Stories:	One two-story and three one-story buildings
Date of Construction:	c. 1956
Basement/ Slab-on-Grade:	Basement and Slab-on-grade
Number of Units:	27
Ceiling Finishes:	Acoustic ceiling tiles and exposed structural elements
Floor Finishes:	Carpet, tile and bare concrete
Wall Finishes:	Painted drywall and exposed structural elements

Property Information	
HVAC:	Natural Gas
Renovation Date:	Unknown
Renovation Description:	An extension was added to the northern side of the building A, bringing it to present day configuration
Vehicular Access:	Via Old Country Road, Rex Place, Knowles Street or Lester Place
Other Improvements:	Paved Parking Areas
Property Coverage:	Footprint of the buildings, sidewalks and associated parking areas

### 2.1.1 Site Operations

The Site is currently occupied by various professional businesses, retail stores, and restaurants. The former Cleaners tenant space is currently occupied by a Subway restaurant.

### 2.1.2 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 80 feet below ground surface (ft-bgs) during previous environmental investigations conducted by Roux. Based on the previous environmental investigations groundwater beneath the Site flows to the south.

## 2.2 Summary of Environmental Conditions

Previous investigations (soil, groundwater, and soil vapor sampling) performed at the Site from 2006 to 2011 identified petroleum-related compounds and CVOCs in the soil, soil vapor and groundwater, predominately tetrachloroethene (PCE) and trichloroethene (TCE), at the Site. The petroleum-related compounds were attributed to a former underground storage tank (UST) that was located in and removed from the rear of the former Cleaners during Site characterization work in 2008 conducted by Leggette, Brashears & Graham, Inc (LBG). The NYSDEC was notified and spill number 0800596 was assigned to the Site. Based upon a review of closure documentation, the spill number was subsequently closed by the NYSDEC on January 28, 2009. During excavation activities, a total of 250.31 tons of soil was removed from the Site for off-Site disposal. According to previous investigators, operations at the former Cleaners 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 and soil vapor in the vicinity of the former Cleaners. Based on Remedial Investigations (RI) completed by Roux in 2015 through 2018, groundwater, soil vapor and indoor air (in the basements of some retail spaces) at the Site have been impacted by CVOCs, predominately PCE and TCE, above applicable regulatory guidance values. Prior to the 1970's, there were cesspools and leaching fields installed in the rear parking lot areas of Site. The Site's sanitary system was not connected to the Municipal sanitary sewer line until the 1970's. Soil samples collected in the vicinity of what is believed to be the former cesspools and around the former sump area below the basement of the Former Cleaners has not identified a source for the PCE and TCE detected in soil vapor and indoor air.

### 2.2.1 Inactive Hazardous Waste Disposal Site Number 130201

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. A Class 2 site is a site where hazardous waste presents a threat to public health or the environment, and a remediation action is required.

The NYSDEC and Morton Village entered into an Order on Consent in November 2014 to develop and implement an investigation and remedial program at the Site to define the nature and extent of any contamination resulting from previous activities of the former Cleaners.

### 2.2.2 Previous Environmental Sampling

The following is a brief summary of environmental sampling conducted at the Site, focusing on soil vapor and indoor air results. A complete description of previous environmental sampling conducted at the Site will be included in the RI/FS. A description of previous environmental sampling conducted at the Site by others between 2006 and 2011 is included in the NYSDEC-approved Remedial Investigation Work Plan (RIWP) prepared by Roux, dated September 2015 based on a review of the following reports:

- 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 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.; and
- Site Characterization Report - Former Morton Village Cleaners prepared by HRP Associates, Inc. dated August 2011 on behalf of the NYSDEC.

During Remedial Investigation (RI) activities conducted by Roux between 2015 and 2017, a total of 17 sub-slab soil vapor, 16 indoor air and eight soil vapor samples were collected at the Site. All sample locations are shown on Figure 2. Below is a summary of PCE and TCE concentrations only (Tables 1 and 2) detected in sub-slab soil vapor and corresponding indoor air, and soil vapor samples collected at the Site. Additionally, Table 1 below includes the New York State Department of Health (NYSDOH) Matrices Stage, included in the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York dated October 2006 and revised in May 2017 (NYSDOH Guidance; Appendix A), for each sample:

**Table 1: Sub-Slab Soil Vapor/Indoor Air PCE and TCE Concentrations**

Sample Location	Sample Date	PCE Sub-Slab Concentrations / Sample Designation (µg/m³)	PCE Indoor Air Concentrations / Sample Designation (µg/m³)	TCE Sub-Slab Concentrations / Sample Designation (µg/m³)	TCE Indoor Air Concentrations / Sample Designation (µg/m³)	NYSDOH Matrices Stage
Card Store*	11/20/2017	145 (OSV-11) 3.72 (OSV-12)	0.658 (IA-CS-1) 0.80 (IA-CS-2)	4.12 (OSV-11) ND (OSV-12)	0.231 (IA-CS-1) 0.199 (IA-CS-2)	No Further Action
Liquor Store**	11/20/2017	26 (OSV-10)	1.66 (IA-LQ-1)	9.4 (OSV-10)	0.161 (IA-LQ-1)	No Further Action
Dance Studio**	11/20/2017	1.51 (OSV-9)	0.834 (IA-DS-1)	ND (OSV-9)	0.302 (IA-DS-1)	No Further Action
CVS*	3/21/2017	12,900 (OSV-3) 12,700 (OSV-4)	160 (IA-CVS-1) 66.8 (IA-CVS-2)	1,210 (OSV-3) 1,300 (OSV-4)	6.56 (IA-CVS-1) 3.12 (IA-CVS-2)	Mitigate
	11/20/2017	2,470 (OSV-8)	113 (IA-CVS-4)	178 (OSV-8)	4.22 (IA-CVS-4)	
CVS**	3/21/2017	60.80 (OSV-5)	3.47 (IA-CVS-3)	6.18 (OSV-5)	0.167 (IA-CVS-3)	No Further Action
Former Cleaners*	3/22/2016	18,800 (SV-1) 14,200 (SV-2) 1,500 (SV-3 DUP) 1,170 (SV-4)	24.8 (IA-1_Basement)	1,280 (SV-1) 763 (SV-2) 66.6 (SV-3 DUP) 67.7 (SV-4)	0.79 (IA-1_Basement)	Mitigate
Buffalo Grille*	3/21/2017	9,760 (OSV-2)	26.4 (IA-BG)	519 (OSV-2)	1.3 (IA-BG)	Mitigate
Nail and Spa 2000*	11/20/2017	104 (OSV-6) 115 (OSV-7)	13.4 (IA-NS-1) 18.9 (IA-NS-2)	4.77 (OSV-6) 9.3 (OSV-7)	0.564 (IA-NS-1) 0.785 (IA-NS-2)	Mitigate
VisionWorks*	3/21/2017	21.6 (OSV-1)	7.53 (IA-VW)	ND (OSV-1)	0.355 (IA-VW)	No Further Action

\* - Basement

\*\* - Slab-on-grade

µg/m³ - Micrograms per cubic meter

NYSDOH – New York State Department of Health

ND - Not Detected

DUP - Duplicate sample

**Table 2: Soil Vapor PCE and TCE Concentrations**

Sample Location	Sample Date	PCE Concentrations (µg/m³)	TCE Concentrations (µg/m³)
SV-5	11/2/2016	4.23	12.5
SV-6	11/2/2016	314	114
SV-7	11/4/2016	30,700	2,600

Sample Location	Sample Date	PCE Concentrations (µg/m <sup>3</sup> )	TCE Concentrations (µg/m <sup>3</sup> )
SV-8	11/2/2016	649	5.7
SV-9	11/2/2016	342	11.2
SV-10	3/21/2017	ND	ND
SV-11	3/21/2017	11.7	ND

µg/m<sup>3</sup> - Micrograms per cubic meter

Based on a comparison PCE and TCE concentrations detected in sub-slab soil vapor and indoor air samples to the NYSDOH Soil Vapor/Indoor Air Matrices, PCE and TCE concentrations detected in sub-slab and indoor air samples collected within the spaces currently occupied by CVS, former Cleaners, Buffalo Grille, and Nail and Spa 2000 require mitigation. Therefore, all tenant spaces between Vision Works on the western side of the Shopping Center and CVS in the central portion of the shopping center will be addressed by the proposed SSDS.

### 3. Scope of Work

The scope of work for the IRM consists of the following tasks:

- Site mobilization and Site preparation;
- Installation of the SSDS components;
- Waste disposal (assumed to be minimal); and
- Documentation.

Implementation of the IRM will be in accordance with the Soils/Materials Management Plan (SoMP) included in Section 4 of this IRM Work Plan.

#### 3.1 Mobilization and Site Preparation

A project kick-off meeting will be conducted with NYSDEC, Morton Village, Roux and the selected Contractor prior to the commencement of any intrusive activities, if requested by NYSDEC. The Contractor will supply any labor (HAZWOPER Certified in accordance with OSHA 1910.120) and materials required for the implementation of the IRM scope of work. In addition, necessary permits, insurance, bonds, and licenses required to complete the work will be obtained and fees necessary to obtain these permits will be paid. Mobilization and Site preparation activities include:

1. Mobilization of equipment to the work area;
2. Installation of work area delineation zones;
3. Installation of sub-slab suction points and laterals;
4. Installation of header piping and roof leaders;
5. Installation of blowers on roof; and
6. Demobilization of equipment.

#### 3.2 SSDS Installation

Sub-slab soil vapor samples collected during the RI detected elevated concentrations of PCE and TCE on-Site; therefore, an active SSDS is proposed to be installed beneath the portions of the Site building shown on Plate 1 to address potential exposure pathways. The proposed active SSDS will include vertical polyvinyl chloride (PVC) suction points and horizontal perforated PVC suction laterals to be retrofitted into the existing building foundation while maintaining the structural integrity of the foundation. The testing of the SSDS will be completed following installation.

The active SSDS for the Site, when complete, will consist of a network of vertical suction points and horizontal suction laterals creating a vacuum influence beneath the portion of the building basement slab shown on Drawing 1 (Appendix B), and two vacuum blowers (one for the east side of the building and one for the west side). The SSDS will be designated SSDS-East and SSDS-West. The SSDS floor plan design and piping details are provided in Appendix B. A description of the proposed active SSDS is provided below.

- All existing interior utility and slab penetrations will be sealed with silicone caulking, to the extent feasible.
- Five vertical suction points and two horizontal suction laterals will be installed to create the required vacuum influence below the basement slab of portions of the Site building. All suction points and laterals will consist of 4-inch PVC piping.

- Each suction point and lateral will have a shut off valve and vacuum gauge.
- The piping from the suction points and laterals will be brought to the roof along the interior of the building and be manifolded to two separate headers. Each header will be connected to a vacuum blower on the roof of the building. A 5.5 horsepower (Hp) explosion proof vacuum blower (East Blower) will be provided for the suction points located on the west side of the building and a second 5.5 Hp explosion proof vacuum blower (West Blower) will be provided for the suction points located on the east side of the building. The drawing in Appendix B shows suction points/laterals and piping associated with Blower B (West) in red and suction points/laterals associated with Blower A (East) in blue. Blowers and piping headers will be located on the roof, as not to interfere with the existing Site use.
- Any interior piping will be routed around existing heating, ventilation, and air conditioning (HVAC) ducts and utility pipes and supported, as needed. Exterior piping will be supported appropriately.
- Extracted vapor evaluation:
  - A Division of Air Resources (DAR 1) screening analysis was performed for selected compounds identified in the sub-slab soil vapor samples to determine if the estimated emissions from the operation of the active SSDS would exceed the permissible limits. Appendix C presents the DAR 1 screening level worksheet for the evaluation of PCE, TCE and 1,2-Dichloroethane (DCE), which were identified as the constituents of concern for the evaluation based on the relatively high concentrations observed in the sub-slab soil vapor samples and the low guidance concentrations (i.e., allowable discharge limits). The DAR 1 evaluation was employed using the contaminant emission rate (pounds per hour) based on the vapor samples collected in March 2016 and March 2017. The emission impacts were compared to the annual guidance concentration (AGC) values and the short-term guidance concentration (SGC) values from the July 14, 2016 DAR 1 AGC/SGC Tables. Based on the DAR 1 analysis, the estimated contaminant emission rates are below the AGC and SGC values for PCE, TCE and DCE and therefore vapor treatment is not required prior to discharge. This will be confirmed during SSDS start-up testing, as described in Section 3.3.
- Each vacuum blower will be installed on the roof on timber supports. The discharge stacks will extend a minimum of 10 feet above the roof line, and will be supported as necessary. The discharge points will be located a minimum of 10 feet from any HVAC air inlets and the building edge.
- Eleven sub-slab soil vapor monitoring points will be used to monitor the performance of the SSDS. Four new monitoring points (MP-1 through MP-4) will be installed approximately where shown on Drawing 1 in Appendix B and seven existing sub-slab sampling points (SV-2, OSV-1, OSV-2, OSV-4, OSV-6, OSV-7 and OSV-8) will be used.
- The blowers were designed with excess capacity so additional suction points can be added if adequate depressurization of the sub-slab is not achieved. Capped PVC tees were included in the piping design to facilitate future connection of additional suction points, if necessary.

### 3.3 SSDS Startup and Testing

Performance monitoring will be performed on SSDS-East and SSDS-West as part of the SSDS start-up to verify that the systems are operating properly and will consist of the following for each system:

- Confirm operation of the local alarm warning light and remote alarm;
- Confirm acceptable air flow rate (90 to 180 cubic feet per minute [cfm]) from the SSDS blower by a visual inspection of gauges affixed to each blower;
- Confirm acceptable negative pressure readings (-20 to -50 inches of water column) from the SSDS and suction points by a visual inspection of gauges to each blower and suction point or lateral;
- Confirm acceptable negative differential pressure (a minimum of -0.004 inches of water column) beneath the building from monitoring points by using an appropriate micromanometer;



- Collect photoionization detector (PID) readings; and
- Collect confirmation effluent air samples.

Negative differential pressure measurements will be collected from the soil vapor monitoring points shown on SSDS Drawing 1 included in Appendix B. The negative pressure measurements will be collected using a micromanometer capable of monitoring differential pressure at a minimum of 0.001 inches of water column. If adequate depressurization (e.g., negative differential pressure of at least -0.004 inches of water column) is not occurring, the cause for the lack of depressurization will be investigated and repaired, and measurements will be collected again.

Following the initial start-up, performance monitoring of the SSDS will also include monitoring the system effluent VOC concentrations using a PID. In addition, during start-up of the SSDS, an effluent air sample will be collected from the discharge of each blower using a Summa canister and analysed using USEPA TO-15 to verify that vapor treatment is not needed. The effluent air sample results will be compared to the DAR-1 Air Guide guidance values. If the sample results indicate that treatment is required, appropriate treatment options will be evaluated and installed.

The system testing described above (excluding effluent air sampling) will be conducted if, in the course of the SSDS lifetime, significant changes are made to the SSDS, or if the system is shut down for an extended period for any reason, and the system must be restarted.

### 3.4 SSDS Operation, Maintenance and Monitoring (O, M &M)

O, M & M procedures for the SSDS will be included in the Site Management Plan (SMP) for the Site, but are outlined herein for the period prior to the SMP being in place.

#### 3.4.1 System Operation: Routine Operation Procedures

Routine operation procedures will consist of monitoring the vacuum at the blower inlet and recording dilution valve setting (i.e., 50% open).

#### 3.4.2 System Operation: Routine Equipment Maintenance

The routine maintenance activities include visual inspections, operating data collection and general maintenance. Visual inspection is the routine part of the SSDS operator's activities. The system operator will note any conditions that present a potential hazard or could cause future system shutdown. In the field, special attention will be paid to the condition of the blower and appurtenances, and the above slab discharge piping and supports. Special attention will also be given to any unusual or excessive noise or vibrations from the piping and blower. The piping and valves will be inspected for leaks.

All equipment maintenance and inspections will be performed in accordance with manufacturer's instructions (See Appendix D for specifications). Specific routine maintenance tasks are outlined below:

- Inspect control panel and warning lights/alarms and remote alarm;
- Inspect blower piping to confirm operation of appropriate valves (i.e., dilution valve);
- Inspect vacuum/pressure gauges for proper operation;
- Check and clean air filter on moisture knockout tank; and
- Check for the presence of and remove water in knockout tank.

In the event that a condition warranting system component maintenance is identified, the appropriate reporting and maintenance should be conducted immediately. Manufacturer's recommendations for system component maintenance are included in the competent manuals in Appendix D. Any maintenance completed for the SSDS should be documented in the Maintenance Log included in Appendix E.

### 3.4.3 System Operation: Non-Routine Equipment Maintenance

Non-routine equipment maintenance consists of maintenance activities that will be performed with less frequency than the routine maintenance (i.e., semi-annually) on several system components. Specific non-routine maintenance tasks are outlined below:

- Inspect and test local and remote alarms;
- Check float switch in each knockout tank for proper operation;
- Replacement of vacuum/pressure gauges; and
- Change bearings on blowers after 15,000 hours of operation.

Most damage or problems associated with SSDS components will trigger one of the alarms. Damage to any SSDS components will be noted during the routine and detailed system inspections and remedied upon identification.

Accumulated condensate will be containerized in a 55-gallon drum for future off-Site disposal, if necessary based upon sample results from the first batch of drummed condensate and pending NYSDEC Contained-In Determination approval. Manufacturer's recommendations for SSDS component maintenance are included in the component manuals in Appendix D. Any maintenance completed for the SSDS should be documented in the SSDS Log included in Appendix E.

In the event that low SSDS air flow rates or vacuum are observed anywhere in the SSDS, further SSDS balancing may be necessary following moisture removal, to ensure that the combined air flow rates and vacuum in a given area of the Site achieve the minimum design requirements.

## 3.5 Waste Disposal

All wastes generated during the installation of the SSDS will be handled, transported and disposed of in a manner consistent with Federal, State and local laws and regulations. A limited amount of soil is anticipated to be generated during SSDS installation since the majority of the SSDS piping will be installed above the basement concrete slab/floor. However, based on results of soil samples collected during RI activities, soil containing elevated concentration of CVOCs is not anticipated to be encountered during SSDS installation and is expected to be declassified as non-hazardous waste under the NYSDEC Contained-In Determination Policy and disposed of as non-hazardous waste, pending NYSDEC approval.

## 3.6 Documentation

Detailed information regarding the IRM (e.g., as-built drawings, waste disposal documentation, backfill documentation, photographs, etc.) will be included in the Construction Completion Report (CCR) described in Section 5.

## 4. Soil/Materials Management Plan

Although the amount of earthwork is expected to be very limited, the following sections provide the SoMP to be implemented during the IRM, as necessary.

### 4.1 Soil Screening Methods

Visual, olfactory and PID soil screening and assessment will be performed during SSDS installation activities under the supervision of Roux personnel.

### 4.2 Containerization of Waste

All soil generated during SSDS installation will be containerized in labeled, New York State Department of Transportation (NYSDOT) rated 55-gallon drums or roll-off containers, which will be fitted with tight fitting covers. If waste is determined to be hazardous, it will be disposed of within 90 days of generation at an approved hazardous waste disposal facility.

### 4.3 Characterization of Excavated Materials

Soil/fill or other excavated media that will be transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations.

### 4.4 Materials Excavation and Load Out

Roux will oversee all invasive work and the excavation and load-out of all excavated material. The quantity of waste is expected to be very limited and it will be containerized in drums for disposal. Loadout and trucking of bulk waste is not expected.

Morton Village and its contractors are solely responsible for safe execution of all invasive and other work performed under this SoMP. Support of excavation, though unlikely due to the nature of the work, will be provided, if necessary, based upon Site conditions and local regulations.

### 4.5 Materials Transport Off-Site

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

The proposed inbound truck route to the Site is:

Take I-278 to I-495 (Long Island Expressway) east in New York. Take exit 44 S, NY-135 S toward Seaford. Take exit 10 from NY-135 S and make a left onto Old Country Road (east bound). Entrance to the Site will be on the left.

The proposed outbound truck route from the Site is:

Take Old Country Road (west bound) to NY-135 N toward Syosset. Take exit 13W (I-495 W) to exit 17 (I-278).

These are the most appropriate routes and take into account: (a) limiting transport through residential areas and past sensitive sites; (b) prohibiting off-Site queuing of trucks entering the facility; (c) limiting total distance to major highways; (d) promoting safety in access to highways; and (e) overall safety in transport. To the extent possible, trucks will travel to/from the Site using these approved truck routes.

Trucks will avoid stopping and idling in the neighborhood outside the project Site, to the extent practicable. Queuing of trucks will be performed on-Site.

Egress points for truck and equipment transport from the Site will be kept clean of dirt and other materials during the IRM implementation.

#### 4.6 Materials Disposal Off-Site

All soil/fill/solid waste excavated and removed from the Site will be disposed of in accordance with regulatory requirements based on the levels of contamination found to be present in waste characterization samples collected.

The following documentation will be obtained and reported for each disposal location used in this project to demonstrate and document that the disposal of material derived from the Site conforms with all applicable laws: (1) a letter or facility-specific waste profile/application from Roux or Morton Village to the receiving facility describing the material to be disposed and requesting formal written acceptance of the material. This letter/profile/application will state that material to be disposed is contaminated material generated at an environmental remediation Site in New York State. The letter will provide the project identity and the name and phone number of Roux or Morton Village. The letter will include as an attachment a summary of all chemical data for the material being transported (including Site Characterization data); (2) a letter from all receiving facilities stating it is in receipt of the correspondence (above) and is approved to accept the material. These documents will be included in the CCR; and (3) a Contained-In Determination approval from the NYSDEC declassifying the waste as non-hazardous, unless waste characterization sampling indicates the waste is characteristically hazardous.

The CCR will include an accounting of the destination of all material removed from the Site during this IRM. This information will also be presented in a tabular form in the CCR.

A Bill of Lading system or equivalent will be used for off-Site movement of non-hazardous wastes and contaminated soils. This information will be reported in the CCR.

Hazardous and non-hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable local, State, and Federal regulations.

Appropriately licensed haulers will be used for material removed from this Site and will be in compliance with all applicable local, State and Federal regulations.

Waste characterization will be performed for off-Site disposal in a manner suitable to the receiving facility and in conformance with applicable permits. All data available for soil/material to be disposed at a given facility must be submitted to the disposal facility with suitable explanation prior to shipment and receipt.

#### 4.7 Materials Reuse On-Site

Soil reuse is not anticipated as part of the IRM.

## 4.8 Fluids Management

Liquids (if any) to be removed from the Site will be handled, transported and disposed in accordance with applicable laws and regulations. Liquid waste manifests will be reported to NYSDEC in the CCR.

Characterization of fluids for off-Site disposal will be performed in a manner suitable to the receiving facility and in conformance with applicable permits.

## 4.9 Backfill from Off-Site Sources

All materials proposed for import onto the Site will be approved by Roux and will be in compliance with provisions in this IRM prior to receipt at the Site.

Material from industrial sites, spill sites, other environmental remediation sites or other potentially contaminated sites will not be imported to the Site. Solid waste will not be imported onto the Site.

All imported soils will meet NYSDEC approved backfill or cover soil quality objectives for this Site. These NYSDEC approved backfill or cover soil quality objectives are the lower of the protection of groundwater or the protection of public health soil cleanup objectives for Commercial or higher use as set forth in Table 375-6.8(b) of 6 NYCRR Part 375. Non-compliant soils will not be imported onto the Site without prior approval by NYSDEC. Nothing in the approved IRM Work Plan or its approval by NYSDEC should be construed as an approval for this purpose.

Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this Site, will not be imported onto the Site without prior approval by NYSDEC. Nothing in this IRM Work Plan should be construed as an approval for this purpose.

In accordance with DER-10, the following material may be imported, without chemical testing, to be used as backfill beneath pavement, buildings or as part of the final Site cover, provided that it contains less than 10% by weight material which would pass through a size 80 sieve and consists of:

- Gravel, rock or stone, consisting of virgin material from a NYSDEC permitted mine or quarry; or
- Recycled concrete or brick from a NYSDEC registered construction and demolition debris processing facility if the material conforms to the requirements of Section 304 of the New York State Department of Transportation *Standard Specifications Construction and Materials Volume 1* (2002).

Trucks entering the Site with imported soils will be securely covered with tight fitting covers.

## 4.10 Stormwater Pollution Prevention

Although disturbance of soil outside the building footprint is not expected to be part of the scope, if changes to the scope require soil disturbance outside the building footprint, applicable laws and regulations pertaining to stormwater pollution prevention will be addressed. If necessary, erosion and sediment control measures (silt fences and/or barriers, and/or hay bale checks) will be installed, as appropriate, around the entire perimeter of the remedial construction area and inspected once a week and after every storm event to ensure that they are operating appropriately. Discharge locations will be inspected to determine whether erosion control measures are effective in preventing significant impacts to receptors. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by NYSDEC. All necessary repairs to erosion and sediment controls shall be made immediately. Accumulated sediments will be

removed as required to keep the barrier and hay bale check functional. Undercutting or erosion of the silt fence anchor will be repaired immediately with appropriate backfill materials. Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

#### 4.11 Contingency Plan

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during implementation of the IRM. Due to the nature of the proposed work, discovery of previously unknown USTs is extremely unlikely.

If previously unidentified contaminant sources are found during implementation of the IRM, sampling will be performed on potentially contaminated source material and surrounding soils and reported to NYSDEC. Chemical analytical work will be for full suite of parameters (target compound list [TCL] VOCs, TCL semivolatile organic compounds [SVOCs], target analyte list [TAL] metals, TCL polychlorinated biphenyls [PCBs], pesticides and herbicides).

Identification of unknown or unexpected contaminated media identified by screening during invasive Site work will be promptly communicated by phone to NYSDEC's Project Manager. These findings will also be included in weekly and periodic electronic reports.

#### 4.12 Community Air Monitoring Plan (CAMP)

Due to the nature of the work, with no intrusive work occurring outside the footprint of the building, community air monitoring is not required. If the scope changes, NYSDEC will be notified and a CAMP will be prepared. Health and safety monitoring for workers will be performed in accordance with the Health and Safety Plan (HASP; Appendix F).

#### 4.13 Odor, Dust and Nuisance Control Plan

The CCR will include the following certification by the certifying professional engineer: "I certify that all invasive work during the remediation and all invasive development work were conducted in accordance with dust and odor suppression methodology defined in the IRM Work Plan."

##### 4.13.1 Odor Control Plan

In addition to the health and safety monitoring described in the HASP (Appendix F), Roux will closely monitor the presence of odors emanating from the work area within the building. This odor control plan is capable of controlling emissions of nuisance odors on-Site. Due to the nature of the project, with all intrusive work occurring in the basement of the existing building, t nuisance odor will not be generated at the sidewalk level surrounding the Site. The HASP will contain specific measures to address potential worker exposure to airborne contaminants during the IRM implementation. Specific odor control methods to be used on a routine basis will include limiting open excavation areas, keeping excavations covered, and covering excavated soil (i.e., in covered drums). If nuisance odors are identified, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of all other complaints about the project. Implementation of all odor controls, including the halt of work, will be the responsibility of Roux, who is responsible for certifying the CCR and its subcontractors.

Odor controls will be employed to prevent on- and off-Site odor nuisances. At a minimum, procedures will include: (a) limiting the area of open excavations; (b) shrouding open excavations with tarps and other covers; and (c) use of odor suppressants to cover exposed odorous soils.

#### 4.13.2 Dust Control Plan

Due to the nature of the project, with excavation occurring in the basement of the existing building, generation of nuisance dust at the sidewalk level surrounding the Site will not occur. The HASP will contain specific measures to address potential worker exposure to airborne particulates during the IRM implementation. A dust suppression plan that addresses dust management during invasive on-Site work, will include, at a minimum, the items listed below:

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

#### 4.13.3 Other Nuisances

Noise control will be exercised during the remedial program.

## 5. Reporting

### 5.1 Weekly Reporting During Site Activities

Weekly reports to NYSDEC and NYSDOH will be submitted during the weeks when IRM activities take place. Weekly reports will include an update of progress made during the reporting period; locations of work and quantities of material imported and exported from the Site; a summary of any and all complaints with relevant details (names, phone numbers); a summary of CAMP readings, if implemented, and an explanation of notable Site conditions, etc. If any issues arise (i.e., issues with the CAMP, if implemented) then daily notification will be provided to NYSDOH and NYSDEC.

### 5.2 Construction Completion Report (CCR)

Detailed information regarding the IRM (e.g., general description of the construction activities, as-built of the SSDS, waste disposal documentation, backfill documentation, photographs, etc.) will be included in the CCR. The CCR will be submitted within 60 days after the data usability summary report (DUSR) is complete for any vapor samples collected during the SSDS start-up.



# 6. IRM Implementation Schedule

This IRM Work Plan is anticipated to begin in the third quarter of 2018 and will require approximately four to six weeks to complete. It is anticipated that the actual on-Site duration of major remedial construction tasks will be completed as follows (time frames are not necessarily consecutive):

- Site Mobilization and Preparation ..... one day
- SSDS Installation ..... four to five weeks
- SSDS Startup and Testing ..... two days
- Transportation and Off-Site Disposal ..... one day
- Site Restoration and Demobilization ..... one day
- Submittal of CCR After Startup and Testing Completed ..... 60 days

**Interim Remedial Measure Work Plan**  
***Morton Village Plaza Shopping Center***

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**TABLES**

1. Summary of Volatile Organic Compounds in Air and Soil Vapor

**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		AA-1	AA-1	IA-1_BASEMENT	IA-1_BASEMENT	IA-2_MAIN FLOOR	IA-BG
Sample Date:		03/21/2017	11/20/2017	03/22/2016	03/22/2016	03/22/2016	03/21/2017
Normal Sample or Field Duplicate:		N	N	N	FD	N	N
Parameter	Unit						
1,1,1-Trichloroethane (TCA)	UG/M3	0.109 U	0.109 U	0.109 U	0.109 U	0.109 U	0.109 U
1,1,2,2-Tetrachloroethane	UG/M3	1.37 U	1.37 U	1.37 U	1.37 U	1.37 U	1.37 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	1.53 U	1.53 U	1.53 U	1.53 U	1.53 U	1.53 U
1,1,2-Trichloroethane	UG/M3	1.09 U	1.09 U	1.09 U	1.09 U	1.09 U	1.09 U
1,1-Dichloroethane	UG/M3	0.809 U	0.809 U	0.809 U	0.809 U	0.809 U	0.809 U
1,1-Dichloroethene	UG/M3	0.079 U	0.079 U	0.079 U	0.079 U	0.079 U	0.079 U
1,2,4-Trichlorobenzene	UG/M3	1.48 U	1.48 U	1.48 U	1.48 U	1.48 U	1.48 U
1,2,4-Trimethylbenzene	UG/M3	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	1.54 U	1.54 U	1.54 U	1.54 U	1.54 U	1.54 U
1,2-Dichlorobenzene	UG/M3	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
1,2-Dichloroethane	UG/M3	0.809 U	0.809 U	0.809 U	0.809 U	0.809 U	0.809 U
1,2-Dichloropropane	UG/M3	0.924 U	0.924 U	0.924 U	0.924 U	0.924 U	0.924 U
1,2-Dichlorotetrafluoroethane	UG/M3	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U
1,3-Butadiene	UG/M3	0.442 U	0.442 U	0.442 U	0.442 U	0.442 U	0.442 U
1,3-Dichlorobenzene	UG/M3	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
1,4-Dichlorobenzene	UG/M3	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
1,4-Dioxane (P-Dioxane)	UG/M3	0.721 U	0.721 U	0.721 U	0.721 U	0.721 U	0.721 U
2,2,4-Trimethylpentane	UG/M3	0.934 U	0.934 U	0.934 U	0.934 U	0.934 U	0.934 U
2-Hexanone	UG/M3	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U
4-Ethyltoluene	UG/M3	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U
Acetone	UG/M3	<b>9.93</b>	<b>4.99</b>	<b>28</b>	<b>29.7</b>	<b>21.3</b>	<b>38.7</b>
Allyl Chloride (3-Chloropropene)	UG/M3	0.626 U	0.626 U	0.626 U	0.626 U	0.626 U	0.626 U
Benzene	UG/M3	<b>0.799</b>	0.639 U	0.639 U	0.639 U	0.639 U	<b>0.712</b>
Benzyl Chloride	UG/M3	1.04 U	1.04 U	1.04 U	1.04 U	1.04 U	1.04 U
Bromodichloromethane	UG/M3	1.34 U	1.34 U	1.34 U	1.34 U	1.34 U	1.34 U
Bromoform	UG/M3	2.07 U	2.07 U	2.07 U	2.07 U	2.07 U	2.07 U
Bromomethane	UG/M3	0.777 U	0.777 U	0.777 U	0.777 U	0.777 U	0.777 U
Carbon Disulfide	UG/M3	0.623 U	0.623 U	0.623 U	0.623 U	0.623 U	0.623 U
Carbon Tetrachloride	UG/M3	<b>0.409</b>	<b>0.484</b>	<b>0.459</b>	<b>0.459</b>	<b>0.434</b>	<b>0.428</b>
Chlorobenzene	UG/M3	0.921 U	0.921 U	0.921 U	0.921 U	0.921 U	0.921 U
Chloroethane	UG/M3	0.528 U	0.528 U	0.528 U	0.528 U	0.528 U	0.528 U
Chloroform	UG/M3	0.977 U	0.977 U	0.977 U	0.977 U	0.977 U	0.977 U

**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		AA-1	AA-1	IA-1_BASEMENT	IA-1_BASEMENT	IA-2_MAIN FLOOR	IA-BG
Sample Date:		03/21/2017	11/20/2017	03/22/2016	03/22/2016	03/22/2016	03/21/2017
Normal Sample or Field Duplicate:		N	N	N	FD	N	N
Parameter	Unit						
Chloromethane	UG/M3	<b>0.987</b>	<b>1.1</b>	<b>1.22</b>	<b>1.18</b>	<b>1.29</b>	<b>1.03</b>
Cis-1,2-Dichloroethylene	UG/M3	0.079 U	0.079 U	<b>0.329</b>	<b>0.317</b>	0.079 U	<b>0.706</b>
Cis-1,3-Dichloropropene	UG/M3	0.908 U	0.908 U	0.908 U	0.908 U	0.908 U	0.908 U
Cyclohexane	UG/M3	0.688 U	0.688 U	0.688 U	0.688 U	0.688 U	0.688 U
Dibromochloromethane	UG/M3	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
Dichlorodifluoromethane	UG/M3	<b>1.58</b>	<b>2.47</b>	<b>2.56</b>	<b>1.97</b>	<b>2.4</b>	<b>1.74</b>
Ethanol	UG/M3	<b>18.6</b>	9.42 U	<b>5600</b>	<b>5350</b>	<b>17800</b>	<b>1260</b>
Ethyl Acetate	UG/M3	1.8 U	1.8 U	<b>6.56</b>	<b>6.63</b>	<b>14.5</b>	<b>3.93</b>
Ethylbenzene	UG/M3	0.869 U	0.869 U	0.869 U	0.869 U	0.869 U	0.869 U
Hexachlorobutadiene	UG/M3	2.13 U	2.13 U	2.13 U	2.13 U	2.13 U	2.13 U
Isopropanol	UG/M3	<b>1.39</b>	1.23 U	<b>7.99</b>	<b>7.57</b>	<b>5.53</b>	<b>10.5</b>
m,p-Xylene	UG/M3	1.74 U	1.74 U	1.74 U	1.74 U	1.74 U	1.74 U
Methyl Ethyl Ketone (2-Butanone)	UG/M3	<b>1.52</b>	1.47 U	1.47 U	1.47 U	<b>2.42</b>	1.47 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	2.05 U	2.05 U	2.05 U	2.05 U	2.05 U	2.05 U
Methylene Chloride	UG/M3	<b>5.32</b>	1.74 U	<b>1.9</b>	<b>14</b>	<b>3.82</b>	1.74 U
N-Heptane	UG/M3	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U
N-Hexane	UG/M3	0.705 U	0.705 U	0.705 U	0.705 U	0.705 U	0.705 U
O-Xylene (1,2-Dimethylbenzene)	UG/M3	0.869 U	0.869 U	0.869 U	0.869 U	0.869 U	0.869 U
Styrene	UG/M3	0.852 U	0.852 U	0.852 U	0.852 U	0.852 U	0.852 U
Tert-Butyl Alcohol	UG/M3	1.52 U	1.52 U	1.52 U	1.52 U	1.52 U	<b>4.55</b>
Tert-Butyl Methyl Ether	UG/M3	0.721 U	0.721 U	0.721 U	0.721 U	0.721 U	0.721 U
Tetrachloroethylene (PCE)	UG/M3	<b>0.258</b>	0.136 U	<b>24.8</b>	<b>23.3</b>	<b>0.719</b>	<b>26.4</b>
Tetrahydrofuran	UG/M3	1.47 U	1.47 U	1.47 U	1.47 U	1.47 U	1.47 U
Toluene	UG/M3	<b>4.07</b>	0.754 U	<b>2.14</b>	<b>3.1</b>	<b>1.61</b>	<b>1.86</b>
Trans-1,2-Dichloroethene	UG/M3	0.793 U	0.793 U	0.793 U	0.793 U	0.793 U	0.793 U
Trans-1,3-Dichloropropene	UG/M3	0.908 U	0.908 U	0.908 U	0.908 U	0.908 U	0.908 U
Trichloroethylene (TCE)	UG/M3	0.107 U	<b>0.177</b>	<b>0.79</b>	<b>0.763</b>	0.107 U	<b>1.3</b>
Trichlorofluoromethane	UG/M3	1.12 U	1.12 U	<b>1.29</b>	<b>1.39</b>	<b>1.25</b>	<b>1.55</b>
Vinyl Bromide	UG/M3	0.874 U	0.874 U	0.874 U	0.874 U	0.874 U	0.874 U
Vinyl Chloride	UG/M3	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U

**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		IA-CS-1	IA-CS-2	IA-CVS-1	IA-CVS-2	IA-CVS-3	IA-CVS-4	IA-DS-1	IA-LQ-1
Sample Date:		11/20/2017	11/20/2017	03/21/2017	03/21/2017	03/21/2017	11/20/2017	11/20/2017	11/20/2017
Normal Sample or Field Duplicate:		N	N	N	N	N	N	N	N
Parameter	Unit								
1,1,1-Trichloroethane (TCA)	UG/M3	0.109 U	0.109 U	0.109 U	0.109 U	0.109 U	0.109 U	0.149 UJV	0.109 U
1,1,2,2-Tetrachloroethane	UG/M3	1.37 U	1.37 U	1.37 U	1.37 U	1.37 U	1.37 U	1.88 UJV	1.37 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	1.53 U	1.53 U	1.53 U	1.53 U	1.53 U	1.53 U	2.1 UJV	1.53 U
1,1,2-Trichloroethane	UG/M3	1.09 U	1.09 U	1.09 U	1.09 U	1.09 U	1.09 U	1.49 UJV	1.09 U
1,1-Dichloroethane	UG/M3	0.809 U	0.809 U	0.809 U	0.809 U	0.809 U	0.809 U	1.11 UJV	0.809 U
1,1-Dichloroethene	UG/M3	0.079 U	0.079 U	0.079 U	0.079 U	0.079 U	0.079 U	0.109 UJV	0.079 U
1,2,4-Trichlorobenzene	UG/M3	1.48 U	1.48 U	1.48 U	1.48 U	1.48 U	1.48 U	2.03 UJV	1.48 U
1,2,4-Trimethylbenzene	UG/M3	<b>1.03</b>	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U	1.35 UJV	0.983 U
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	1.54 U	1.54 U	1.54 U	1.54 U	1.54 U	1.54 U	2.11 UJV	1.54 U
1,2-Dichlorobenzene	UG/M3	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.65 UJV	1.2 U
1,2-Dichloroethane	UG/M3	<b>0.89</b>	0.809 U	0.809 U	0.809 U	0.809 U	0.809 U	1.11 UJV	0.809 U
1,2-Dichloropropane	UG/M3	0.924 U	0.924 U	0.924 U	0.924 U	0.924 U	0.924 U	1.27 UJV	0.924 U
1,2-Dichlorotetrafluoroethane	UG/M3	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.4 U	1.92 UJV	1.4 U
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U	1.35 UJV	0.983 U
1,3-Butadiene	UG/M3	0.442 U	0.442 U	0.442 U	0.442 U	0.442 U	0.442 U	0.606 UJV	0.442 U
1,3-Dichlorobenzene	UG/M3	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.65 UJV	1.2 U
1,4-Dichlorobenzene	UG/M3	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U	1.65 UJV	1.2 U
1,4-Dioxane (P-Dioxane)	UG/M3	0.721 U	0.721 U	0.721 U	0.721 U	0.721 U	0.721 U	0.987 UJV	0.721 U
2,2,4-Trimethylpentane	UG/M3	0.934 U	0.934 U	0.934 U	0.934 U	0.934 U	0.934 U	1.28 UJV	0.934 U
2-Hexanone	UG/M3	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	1.12 UJV	0.82 U
4-Ethyltoluene	UG/M3	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U	0.983 U	1.35 UJV	0.983 U
Acetone	UG/M3	<b>17.2</b>	<b>14.8</b>	<b>61.5</b>	<b>35.9</b>	<b>43.7</b>	<b>35.6</b>	<b>17 JV</b>	<b>9.69</b>
Allyl Chloride (3-Chloropropene)	UG/M3	0.626 U	0.626 U	0.626 U	0.626 U	0.626 U	0.626 U	0.858 UJV	0.626 U
Benzene	UG/M3	0.639 U	0.639 U	<b>0.754</b>	<b>0.786</b>	<b>0.661</b>	0.639 U	0.875 UJV	0.639 U
Benzyl Chloride	UG/M3	1.04 U	1.04 U	1.04 U	1.04 U	1.04 U	1.04 U	1.42 UJV	1.04 U
Bromodichloromethane	UG/M3	1.34 U	1.34 U	1.34 U	1.34 U	1.34 U	1.34 U	1.84 UJV	1.34 U
Bromoform	UG/M3	2.07 U	2.07 U	2.07 U	2.07 U	2.07 U	2.07 U	2.83 UJV	2.07 U
Bromomethane	UG/M3	0.777 U	0.777 U	0.777 U	0.777 U	0.777 U	0.777 U	1.06 UJV	0.777 U
Carbon Disulfide	UG/M3	0.623 U	0.623 U	0.623 U	0.623 U	0.623 U	0.623 U	0.853 UJV	0.623 U
Carbon Tetrachloride	UG/M3	<b>0.535</b>	<b>0.51</b>	<b>0.459</b>	<b>0.447</b>	<b>0.428</b>	<b>1.06</b>	<b>0.612 JV</b>	<b>0.547</b>
Chlorobenzene	UG/M3	0.921 U	0.921 U	0.921 U	0.921 U	0.921 U	0.921 U	1.26 UJV	0.921 U
Chloroethane	UG/M3	0.528 U	0.528 U	0.528 U	0.528 U	0.528 U	0.528 U	0.723 UJV	0.528 U
Chloroform	UG/M3	0.977 U	0.977 U	<b>1.03</b>	0.977 U	0.977 U	0.977 U	1.34 UJV	0.977 U

**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		IA-CS-1	IA-CS-2	IA-CVS-1	IA-CVS-2	IA-CVS-3	IA-CVS-4	IA-DS-1	IA-LQ-1
Sample Date:		11/20/2017	11/20/2017	03/21/2017	03/21/2017	03/21/2017	11/20/2017	11/20/2017	11/20/2017
Normal Sample or Field Duplicate:		N	N	N	N	N	N	N	N
Parameter	Unit								
Chloromethane	UG/M3	<b>1.04</b>	<b>1.09</b>	<b>1.63</b>	<b>1.15</b>	<b>1.15</b>	<b>1.31</b>	<b>1.15 JV</b>	<b>1.08</b>
Cis-1,2-Dichloroethylene	UG/M3	0.079 U	0.079 U	<b>3.45</b>	<b>2.01</b>	0.079 U	<b>2.35</b>	0.109 UJV	0.079 U
Cis-1,3-Dichloropropene	UG/M3	0.908 U	0.908 U	0.908 U	0.908 U	0.908 U	0.908 U	1.24 UJV	0.908 U
Cyclohexane	UG/M3	0.688 U	0.688 U	0.688 U	0.688 U	0.688 U	0.688 U	0.943 UJV	0.688 U
Dibromochloromethane	UG/M3	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	1.7 U	2.33 UJV	1.7 U
Dichlorodifluoromethane	UG/M3	<b>2.48</b>	<b>2.46</b>	<b>1.25</b>	<b>1.5</b>	<b>1.57</b>	<b>2.56</b>	<b>2.48 JV</b>	<b>2.53</b>
Ethanol	UG/M3	<b>16.6</b>	<b>12.9</b>	<b>390</b>	<b>496</b>	<b>181</b>	<b>388</b>	<b>167 JV</b>	<b>458</b>
Ethyl Acetate	UG/M3	1.8 U	1.8 U	<b>22.5</b>	<b>6.05</b>	<b>2.28</b>	<b>8.83</b>	2.47 UJV	<b>2.28</b>
Ethylbenzene	UG/M3	0.869 U	0.869 U	0.869 U	0.869 U	0.869 U	0.869 U	1.19 UJV	0.869 U
Hexachlorobutadiene	UG/M3	2.13 U	2.13 U	2.13 U	2.13 U	2.13 U	2.13 U	2.92 UJV	2.13 U
Isopropanol	UG/M3	<b>1.71</b>	<b>1.36</b>	<b>20.3</b>	<b>16.4</b>	<b>11.6</b>	<b>77.2</b>	<b>5.9 JV</b>	<b>3.29</b>
m,p-Xylene	UG/M3	1.74 U	1.74 U	1.74 U	1.74 U	1.74 U	1.74 U	2.38 UJV	1.74 U
Methyl Ethyl Ketone (2-Butanone)	UG/M3	<b>1.93</b>	<b>1.58</b>	1.47 U	1.47 U	1.47 U	<b>1.74</b>	2.02 UJV	1.47 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	2.05 U	2.05 U	2.05 U	2.05 U	2.05 U	2.05 U	2.81 UJV	2.05 U
Methylene Chloride	UG/M3	1.74 U	1.74 U	<b>2.29</b>	1.74 U	1.74 U	<b>1.84</b>	2.38 UJV	1.74 U
N-Heptane	UG/M3	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	0.82 U	1.12 UJV	0.82 U
N-Hexane	UG/M3	0.705 U	0.705 U	0.705 U	0.705 U	0.705 U	0.705 U	0.966 UJV	0.705 U
O-Xylene (1,2-Dimethylbenzene)	UG/M3	0.869 U	0.869 U	0.869 U	0.869 U	0.869 U	0.869 U	1.19 UJV	0.869 U
Styrene	UG/M3	0.852 U	0.852 U	0.852 U	0.852 U	0.852 U	<b>1.22</b>	1.17 UJV	0.852 U
Tert-Butyl Alcohol	UG/M3	1.52 U	1.52 U	<b>10.8</b>	<b>10.1</b>	<b>15</b>	1.52 U	2.08 UJV	1.52 U
Tert-Butyl Methyl Ether	UG/M3	0.721 U	0.721 U	0.721 U	0.721 U	0.721 U	0.721 U	0.988 UJV	0.721 U
Tetrachloroethylene (PCE)	UG/M3	<b>0.658</b>	<b>0.8</b>	<b>160</b>	<b>66.8</b>	<b>3.47</b>	<b>113</b>	<b>0.834 JV</b>	<b>1.66</b>
Tetrahydrofuran	UG/M3	1.47 U	1.47 U	1.47 U	1.47 U	1.47 U	1.47 U	2.02 UJV	1.47 U
Toluene	UG/M3	<b>5.77</b>	<b>4.26</b>	<b>2.76</b>	<b>6.67</b>	<b>1.53</b>	<b>3.3</b>	1.03 UJV	0.754 U
Trans-1,2-Dichloroethene	UG/M3	0.793 U	0.793 U	0.793 U	0.793 U	0.793 U	0.793 U	1.09 UJV	0.793 U
Trans-1,3-Dichloropropene	UG/M3	0.908 U	0.908 U	0.908 U	0.908 U	0.908 U	0.908 U	1.24 UJV	0.908 U
Trichloroethylene (TCE)	UG/M3	<b>0.231</b>	<b>0.199</b>	<b>6.56</b>	<b>3.12</b>	<b>0.167</b>	<b>4.22</b>	<b>0.302 JV</b>	<b>0.161</b>
Trichlorofluoromethane	UG/M3	1.12 U	1.12 U	<b>3.02</b>	<b>1.98</b>	<b>3.59</b>	<b>3</b>	<b>3.57 JV</b>	<b>1.92</b>
Vinyl Bromide	UG/M3	0.874 U	0.874 U	0.874 U	0.874 U	0.874 U	0.874 U	1.2 UJV	0.874 U
Vinyl Chloride	UG/M3	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U	0.051 U	0.07 UJV	0.051 U

**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		IA-NS-1	IA-NS-2	IA-VW	IA-VW	OSV-1	OSV-2	OSV-3	OSV-4
Sample Date:		11/20/2017	11/20/2017	03/21/2017	03/21/2017	03/21/2017	03/21/2017	03/21/2017	03/21/2017
Normal Sample or Field Duplicate:		N	N	N	FD	N	N	N	N
Parameter	Unit								
1,1,1-Trichloroethane (TCA)	UG/M3	0.109 U	0.109 U	0.109 U	0.182 U	1.09 U	10.9 U	10.9 U	10.9 U
1,1,2,2-Tetrachloroethane	UG/M3	1.37 U	1.37 U	1.37 U	2.29 U	1.37 U	13.7 U	13.7 U	13.7 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	1.53 U	1.53 U	1.53 U	2.55 U	1.53 U	15.3 U	15.3 U	15.3 U
1,1,2-Trichloroethane	UG/M3	1.09 U	1.09 U	1.09 U	1.82 U	1.09 U	10.9 U	10.9 U	10.9 U
1,1-Dichloroethane	UG/M3	0.809 U	0.809 U	0.809 U	1.35 U	0.809 U	8.09 U	8.09 U	8.09 U
1,1-Dichloroethene	UG/M3	0.079 U	0.079 U	0.079 U	0.132 U	0.793 U	7.93 U	7.93 U	7.93 U
1,2,4-Trichlorobenzene	UG/M3	1.48 U	1.48 U	1.48 U	2.47 U	1.48 U	14.8 U	14.8 U	14.8 U
1,2,4-Trimethylbenzene	UG/M3	0.983 U	0.983 U	0.983 U	1.64 U	0.983 U	9.83 U	9.83 U	9.83 U
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	1.54 U	1.54 U	1.54 U	2.56 U	1.54 U	15.4 U	15.4 U	15.4 U
1,2-Dichlorobenzene	UG/M3	1.2 U	1.2 U	1.2 U	2 U	1.2 U	12 U	12 U	12 U
1,2-Dichloroethane	UG/M3	0.809 U	0.809 U	0.809 U	1.35 U	0.809 U	8.09 U	8.09 U	8.09 U
1,2-Dichloropropane	UG/M3	0.924 U	0.924 U	0.924 U	1.54 U	0.924 U	9.24 U	9.24 U	9.24 U
1,2-Dichlorotetrafluoroethane	UG/M3	1.4 U	1.4 U	1.4 U	2.33 U	1.4 U	14 U	14 U	14 U
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	0.983 U	0.983 U	0.983 U	1.64 U	0.983 U	9.83 U	9.83 U	9.83 U
1,3-Butadiene	UG/M3	0.442 U	0.442 U	0.442 U	0.737 U	0.442 U	4.42 U	4.42 U	4.42 U
1,3-Dichlorobenzene	UG/M3	1.2 U	1.2 U	1.2 U	2 U	1.2 U	12 U	12 U	12 U
1,4-Dichlorobenzene	UG/M3	1.2 U	1.2 U	1.2 U	2 U	1.2 U	12 U	12 U	12 U
1,4-Dioxane (P-Dioxane)	UG/M3	0.721 U	0.721 U	0.721 U	1.2 U	0.721 U	7.21 U	7.21 U	7.21 U
2,2,4-Trimethylpentane	UG/M3	0.934 U	0.934 U	0.934 U	1.56 U	0.934 U	9.34 U	9.34 U	9.34 U
2-Hexanone	UG/M3	0.82 U	0.82 U	0.82 U	1.36 U	0.82 U	8.2 U	8.2 U	8.2 U
4-Ethyltoluene	UG/M3	0.983 U	0.983 U	0.983 U	1.64 U	0.983 U	9.83 U	9.83 U	9.83 U
Acetone	UG/M3	<b>218</b>	<b>356</b>	<b>786</b>	<b>784</b>	<b>14.3</b>	23.8 U	23.8 U	23.8 U
Allyl Chloride (3-Chloropropene)	UG/M3	0.626 U	0.626 U	0.626 U	1.04 U	0.626 U	6.26 U	6.26 U	6.26 U
Benzene	UG/M3	0.639 U	0.639 U	<b>0.706 JV</b>	1.06 UJV	0.639 U	6.39 U	6.39 U	6.39 U
Benzyl Chloride	UG/M3	1.04 U	1.04 U	1.04 U	1.72 U	1.04 U	10.4 U	10.4 U	10.4 U
Bromodichloromethane	UG/M3	1.34 U	1.34 U	1.34 U	2.23 U	1.34 U	13.4 U	13.4 U	13.4 U
Bromoform	UG/M3	2.07 U	2.07 U	2.07 U	3.44 U	2.07 U	20.7 U	20.7 U	20.7 U
Bromomethane	UG/M3	0.777 U	0.777 U	0.777 U	1.29 U	0.777 U	7.77 U	7.77 U	7.77 U
Carbon Disulfide	UG/M3	0.623 U	0.623 U	0.623 U	1.04 U	0.623 U	6.23 U	6.23 U	6.23 U
Carbon Tetrachloride	UG/M3	<b>0.516</b>	<b>0.572</b>	<b>0.396 JV</b>	<b>0.66 JV</b>	1.26 U	12.6 U	12.6 U	12.6 U
Chlorobenzene	UG/M3	0.921 U	0.921 U	0.921 U	1.53 U	0.921 U	9.21 U	9.21 U	9.21 U
Chloroethane	UG/M3	0.528 U	0.528 U	0.528 U	0.879 U	0.528 U	5.28 U	5.28 U	5.28 U
Chloroform	UG/M3	0.977 U	0.977 U	0.977 U	1.63 U	0.977 U	<b>10.2</b>	9.77 U	9.77 U

**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		IA-NS-1	IA-NS-2	IA-VW	IA-VW	OSV-1	OSV-2	OSV-3	OSV-4
Sample Date:		11/20/2017	11/20/2017	03/21/2017	03/21/2017	03/21/2017	03/21/2017	03/21/2017	03/21/2017
Normal Sample or Field Duplicate:		N	N	N	FD	N	N	N	N
Parameter	Unit								
Chloromethane	UG/M3	1.11	1.14	1.21	1.12	0.413 U	4.13 U	4.13 U	4.13 U
Cis-1,2-Dichloroethylene	UG/M3	0.25	0.349	0.159	0.198	0.793 U	301	674	1590
Cis-1,3-Dichloropropene	UG/M3	0.908 U	0.908 U	0.908 U	1.51 U	0.908 U	9.08 U	9.08 U	9.08 U
Cyclohexane	UG/M3	0.688 U	0.688 U	0.688 U	1.15 U	0.688 U	6.88 U	6.88 U	6.88 U
Dibromochloromethane	UG/M3	1.7 U	1.7 U	1.7 U	2.84 U	1.7 U	17 U	17 U	17 U
Dichlorodifluoromethane	UG/M3	2.52	2.53	1.4	1.8	1.26	9.89 U	9.89 U	9.89 U
Ethanol	UG/M3	292	335	563	650	9.69	94.2 U	94.2 U	94.2 U
Ethyl Acetate	UG/M3	5.87	7.64	92.3	115	1.8 U	18 U	18 U	18 U
Ethylbenzene	UG/M3	0.869 U	0.869 U	0.869 U	1.45 U	0.869 U	8.69 U	8.69 U	8.69 U
Hexachlorobutadiene	UG/M3	2.13 U	2.13 U	2.13 U	3.55 U	2.13 U	21.3 U	21.3 U	21.3 U
Isopropanol	UG/M3	66.4	79.6	242	246	1.49	12.3 U	12.3 U	12.3 U
m,p-Xylene	UG/M3	1.74 U	1.74 U	1.74 U	2.9 U	1.74 U	17.4 U	17.4 U	17.4 U
Methyl Ethyl Ketone (2-Butanone)	UG/M3	1.47 U	1.47 U	1.47 U	2.46 U	1.47 U	14.7 U	14.7 U	14.7 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	2.05 U	2.05 U	11.3	16.2	2.05 U	20.5 U	20.5 U	20.5 U
Methylene Chloride	UG/M3	1.74 U	1.74 U	1.74 U	2.9 U	1.74 U	17.4 U	17.4 U	17.4 U
N-Heptane	UG/M3	0.82 U	0.82 U	0.82 U	1.36 U	0.82 U	8.2 U	8.2 U	8.2 U
N-Hexane	UG/M3	0.705 U	0.705 U	0.705 U	1.17 U	0.705 U	7.05 U	7.05 U	7.05 U
O-Xylene (1,2-Dimethylbenzene)	UG/M3	0.869 U	0.869 U	0.869 U	1.45 U	0.869 U	8.69 U	8.69 U	8.69 U
Styrene	UG/M3	0.852 U	0.852 U	0.852 U	1.42 U	0.852 U	8.52 U	8.52 U	8.52 U
Tert-Butyl Alcohol	UG/M3	1.52 U	1.52 U	1.52 U	2.53 U	1.52 U	15.2 U	15.2 U	15.2 U
Tert-Butyl Methyl Ether	UG/M3	0.721 U	0.721 U	0.721 U	1.2 U	0.721 U	7.21 U	7.21 U	7.21 U
Tetrachloroethylene (PCE)	UG/M3	13.4	18.9	7.53	9.49	21.6	9760	12900	12700
Tetrahydrofuran	UG/M3	1.47 U	1.47 U	1.47 U	2.46 U	1.47 U	14.7 U	14.7 U	14.7 U
Toluene	UG/M3	1.7	1.99	7.27	7.65	1.47	7.54 U	7.54 U	7.54 U
Trans-1,2-Dichloroethene	UG/M3	0.793 U	0.793 U	0.793 U	1.32 U	0.793 U	30.4	11	19.7
Trans-1,3-Dichloropropene	UG/M3	0.908 U	0.908 U	0.908 U	1.51 U	0.908 U	9.08 U	9.08 U	9.08 U
Trichloroethylene (TCE)	UG/M3	0.564	0.785	0.355	0.484	1.07 U	519	1210	1300
Trichlorofluoromethane	UG/M3	1.82	2.17	1.51 JV	1.87 UJV	1.21	11.2 U	11.2 U	11.2 U
Vinyl Bromide	UG/M3	0.874 U	0.874 U	0.874 U	1.46 U	0.874 U	8.74 U	8.74 U	8.74 U
Vinyl Chloride	UG/M3	0.051 U	0.051 U	0.051 U	0.085 U	0.511 U	5.11 U	5.11 U	5.11 U



**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		OSV-5	OSV-6	OSV-7	OSV-8	OSV-9	OSV-10	OSV-11	OSV-12
Sample Date:		03/21/2017	11/20/2017	11/20/2017	11/20/2017	11/20/2017	11/20/2017	11/20/2017	11/20/2017
Normal Sample or Field Duplicate:		N	N	N	N	N	N	N	N
Parameter	Unit								
1,1,1-Trichloroethane (TCA)	UG/M3	1.92 U	1.09 U	1.09 U	<b>8.84 JV</b>	1.09 U	<b>7.58</b>	<b>2.32</b>	1.09 U
1,1,2,2-Tetrachloroethane	UG/M3	2.41 U	1.37 U	1.37 U	6.87 UJV	1.37 U	1.37 U	1.37 U	1.37 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	2.69 U	1.53 U	1.53 U	7.66 UJV	1.53 U	1.53 U	1.53 U	1.53 U
1,1,2-Trichloroethane	UG/M3	1.92 U	1.09 U	1.09 U	5.46 UJV	1.09 U	1.09 U	1.09 U	1.09 U
1,1-Dichloroethane	UG/M3	1.42 U	0.809 U	0.809 U	4.05 UJV	0.809 U	0.809 U	0.809 U	0.809 U
1,1-Dichloroethene	UG/M3	1.39 U	0.793 U	0.793 U	3.96 UJV	0.793 U	0.793 U	0.793 U	0.793 U
1,2,4-Trichlorobenzene	UG/M3	2.61 U	1.48 U	1.48 U	7.42 UJV	1.48 U	1.48 U	1.48 U	1.48 U
1,2,4-Trimethylbenzene	UG/M3	1.73 U	0.983 U	0.983 U	4.92 UJV	0.983 U	0.983 U	0.983 U	0.983 U
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	2.7 U	1.54 U	1.54 U	7.69 UJV	1.54 U	1.54 U	1.54 U	1.54 U
1,2-Dichlorobenzene	UG/M3	2.11 U	1.2 U	1.2 U	6.01 UJV	1.2 U	1.2 U	1.2 U	1.2 U
1,2-Dichloroethane	UG/M3	1.42 U	0.809 U	0.809 U	4.05 UJV	0.809 U	0.809 U	0.809 U	0.809 U
1,2-Dichloropropane	UG/M3	1.62 U	0.924 U	0.924 U	4.62 UJV	0.924 U	0.924 U	0.924 U	0.924 U
1,2-Dichlorotetrafluoroethane	UG/M3	2.45 U	1.4 U	1.4 U	6.99 UJV	1.4 U	1.4 U	1.4 U	1.4 U
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	1.73 U	0.983 U	0.983 U	4.92 UJV	0.983 U	0.983 U	0.983 U	0.983 U
1,3-Butadiene	UG/M3	0.777 U	0.442 U	0.442 U	2.21 UJV	0.442 U	0.442 U	0.442 U	0.442 U
1,3-Dichlorobenzene	UG/M3	2.11 U	1.2 U	1.2 U	6.01 UJV	1.2 U	1.2 U	1.2 U	1.2 U
1,4-Dichlorobenzene	UG/M3	2.11 U	<b>5.77</b>	1.2 U	6.01 UJV	<b>2.14</b>	<b>2.4</b>	<b>1.23</b>	1.2 U
1,4-Dioxane (P-Dioxane)	UG/M3	1.26 U	0.721 U	0.721 U	3.6 UJV	0.721 U	0.721 U	0.721 U	0.721 U
2,2,4-Trimethylpentane	UG/M3	1.64 U	0.934 U	0.934 U	4.67 UJV	0.934 U	0.934 U	0.934 U	0.934 U
2-Hexanone	UG/M3	1.44 U	0.82 U	0.82 U	4.1 UJV	0.82 U	0.82 U	0.82 U	0.82 U
4-Ethyltoluene	UG/M3	1.73 U	0.983 U	0.983 U	4.92 UJV	0.983 U	0.983 U	0.983 U	0.983 U
Acetone	UG/M3	<b>12.7</b>	<b>6.75</b>	<b>10.3 J+V</b>	11.9 UJV	<b>166</b>	<b>7.96</b>	<b>4.49</b>	<b>15.6</b>
Allyl Chloride (3-Chloropropene)	UG/M3	1.1 U	0.626 U	0.626 U	3.13 UJV	0.626 U	0.626 U	0.626 U	0.626 U
Benzene	UG/M3	1.12 U	0.639 U	0.639 U	3.19 UJV	0.639 U	0.639 U	0.639 U	0.639 U
Benzyl Chloride	UG/M3	1.82 U	1.04 U	1.04 U	5.18 UJV	1.04 U	1.04 U	1.04 U	1.04 U
Bromodichloromethane	UG/M3	2.35 U	1.34 U	1.34 U	6.7 UJV	1.34 U	1.34 U	1.34 U	1.34 U
Bromoform	UG/M3	3.63 U	2.07 U	2.07 U	10.3 UJV	2.07 U	2.07 U	2.07 U	2.07 U
Bromomethane	UG/M3	1.36 U	0.777 U	0.777 U	3.88 UJV	0.777 U	0.777 U	0.777 U	0.777 U
Carbon Disulfide	UG/M3	1.09 U	0.623 U	0.623 U	3.11 UJV	0.623 U	0.623 U	0.623 U	0.623 U
Carbon Tetrachloride	UG/M3	2.21 U	1.26 U	1.26 U	6.29 UJV	1.26 U	1.26 U	1.26 U	1.26 U
Chlorobenzene	UG/M3	1.62 U	0.921 U	0.921 U	4.61 UJV	0.921 U	0.921 U	0.921 U	0.921 U
Chloroethane	UG/M3	0.926 U	0.528 U	0.528 U	2.64 UJV	0.528 U	0.528 U	0.528 U	0.528 U
Chloroform	UG/M3	1.71 U	<b>4.84</b>	<b>1.78</b>	<b>6.54 JV</b>	0.977 U	0.977 U	0.977 U	0.977 U

**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		OSV-5	OSV-6	OSV-7	OSV-8	OSV-9	OSV-10	OSV-11	OSV-12
Sample Date:		03/21/2017	11/20/2017	11/20/2017	11/20/2017	11/20/2017	11/20/2017	11/20/2017	11/20/2017
Normal Sample or Field Duplicate:		N	N	N	N	N	N	N	N
Parameter	Unit								
Chloromethane	UG/M3	0.725 U	0.413 U	<b>1.04</b>	2.07 UJV	<b>0.576</b>	<b>0.555</b>	0.413 U	<b>1.03</b>
Cis-1,2-Dichloroethylene	UG/M3	<b>6.03</b>	0.793 U	0.793 U	<b>26.2 JV</b>	0.793 U	0.793 U	0.793 U	0.793 U
Cis-1,3-Dichloropropene	UG/M3	1.59 U	0.908 U	0.908 U	4.54 UJV	0.908 U	0.908 U	0.908 U	0.908 U
Cyclohexane	UG/M3	1.21 U	0.688 U	0.688 U	3.44 UJV	<b>1.22</b>	0.688 U	0.688 U	0.688 U
Dibromochloromethane	UG/M3	2.99 U	1.7 U	1.7 U	8.52 UJV	1.7 U	1.7 U	1.7 U	1.7 U
Dichlorodifluoromethane	UG/M3	1.74 U	<b>1.84</b>	<b>2.25</b>	4.94 UJV	<b>2.33</b>	<b>2.25</b>	<b>2.29</b>	<b>2.52</b>
Ethanol	UG/M3	<b>45.4</b>	9.42 U	9.42 U	47.1 UJV	<b>228</b>	<b>181</b>	9.42 U	<b>14.6</b>
Ethyl Acetate	UG/M3	3.16 U	1.8 U	1.8 U	9.01 UJV	1.8 U	1.8 U	1.8 U	1.8 U
Ethylbenzene	UG/M3	1.52 U	0.869 U	0.869 U	4.34 UJV	0.869 U	0.869 U	0.869 U	0.869 U
Hexachlorobutadiene	UG/M3	3.74 U	2.13 U	2.13 U	10.7 UJV	2.13 U	2.13 U	2.13 U	2.13 U
Isopropanol	UG/M3	<b>2.73</b>	1.23 U	<b>2.93</b>	6.15 UJV	<b>39.1</b>	<b>1.73</b>	1.23 U	<b>1.32</b>
m,p-Xylene	UG/M3	<b>3.85</b>	<b>2.14</b>	1.74 U	8.69 UJV	1.74 U	1.74 U	1.74 U	1.74 U
Methyl Ethyl Ketone (2-Butanone)	UG/M3	2.59 U	<b>1.65</b>	<b>1.99</b>	7.37 UJV	<b>5.4</b>	1.47 U	1.47 U	1.47 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	3.59 U	2.05 U	2.05 U	10.2 UJV	2.05 U	2.05 U	2.05 U	2.05 U
Methylene Chloride	UG/M3	3.05 U	1.74 U	<b>1.78</b>	8.69 UJV	1.74 U	1.74 U	1.74 U	1.74 U
N-Heptane	UG/M3	1.44 U	0.82 U	0.82 U	4.1 UJV	0.82 U	0.82 U	0.82 U	0.82 U
N-Hexane	UG/M3	1.24 U	<b>1.98</b>	<b>0.874</b>	3.52 UJV	<b>1.4</b>	<b>1.21</b>	<b>1.33</b>	<b>1.27</b>
O-Xylene (1,2-Dimethylbenzene)	UG/M3	<b>2.01</b>	0.869 U	0.869 U	4.34 UJV	0.869 U	0.869 U	0.869 U	0.869 U
Styrene	UG/M3	1.49 U	0.852 U	0.852 U	4.26 UJV	0.852 U	0.852 U	0.852 U	0.852 U
Tert-Butyl Alcohol	UG/M3	2.66 U	1.52 U	<b>18</b>	7.58 UJV	<b>8.58</b>	1.52 U	1.52 U	1.52 U
Tert-Butyl Methyl Ether	UG/M3	1.27 U	0.721 U	0.721 U	3.61 UJV	0.721 U	0.721 U	0.721 U	0.721 U
Tetrachloroethylene (PCE)	UG/M3	<b>60.8</b>	<b>104</b>	<b>115</b>	<b>2470 JV</b>	<b>1.51</b>	<b>26</b>	<b>145</b>	<b>3.72</b>
Tetrahydrofuran	UG/M3	2.59 U	<b>3.92</b>	<b>6.43</b>	7.37 UJV	<b>2.98</b>	1.47 U	1.47 U	1.47 U
Toluene	UG/M3	<b>10.1</b>	<b>1.37</b>	<b>1.24</b>	3.77 UJV	<b>1.42</b>	<b>0.935</b>	<b>1.12</b>	<b>5.28</b>
Trans-1,2-Dichloroethene	UG/M3	1.39 U	0.793 U	0.793 U	3.96 UJV	0.793 U	0.793 U	0.793 U	0.793 U
Trans-1,3-Dichloropropene	UG/M3	1.59 U	0.908 U	0.908 U	4.54 UJV	0.908 U	0.908 U	0.908 U	0.908 U
Trichloroethylene (TCE)	UG/M3	<b>6.18</b>	<b>4.77</b>	<b>9.3</b>	<b>178 JV</b>	1.07 U	<b>9.4</b>	<b>4.12</b>	1.07 U
Trichlorofluoromethane	UG/M3	<b>8.99</b>	<b>1.65</b>	<b>1.4</b>	<b>6.01 JV</b>	<b>3.39</b>	<b>2.93</b>	<b>37.1</b>	1.12 U
Vinyl Bromide	UG/M3	1.53 U	0.874 U	0.874 U	4.37 UJV	0.874 U	0.874 U	0.874 U	0.874 U
Vinyl Chloride	UG/M3	0.897 U	0.511 U	0.511 U	2.56 UJV	0.511 U	0.511 U	0.511 U	0.511 U

**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		SV-1	SV-2	SV-3	SV-3	SV-4	SV-5	SV-6	SV-7
Sample Date:		03/22/2016	03/22/2016	03/22/2016	03/22/2016	03/22/2016	11/02/2016	11/02/2016	11/04/2016
Normal Sample or Field Duplicate:		N	N	N	FD	N	N	N	N
Parameter	Unit								
1,1,1-Trichloroethane (TCA)	UG/M3	48.1 U	33.4 U	2.73 U	3.64 U	2.73 U	1.09 U	1.09 U	96 U
1,1,2,2-Tetrachloroethane	UG/M3	60.5 U	42 U	3.43 U	4.58 U	3.43 U	1.37 U	1.37 U	121 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	67.5 U	46.9 U	3.83 U	5.11 U	3.83 U	1.53 U	1.53 U	135 U
1,1,2-Trichloroethane	UG/M3	48.1 U	33.4 U	2.73 U	3.64 U	2.73 U	1.09 U	1.09 U	96 U
1,1-Dichloroethane	UG/M3	35.7 U	24.8 U	2.02 U	2.7 U	2.02 U	0.809 U	0.809 U	71.2 U
1,1-Dichloroethene	UG/M3	34.9 U	24.3 U	1.98 U	2.64 U	1.98 U	0.793 U	0.793 U	69.8 U
1,2,4-Trichlorobenzene	UG/M3	65.4 U	45.4 U	3.71 U	4.95 U	3.71 U	1.48 U	1.48 U	131 U
1,2,4-Trimethylbenzene	UG/M3	43.3 U	30.1 U	2.46 U	3.28 U	2.46 U	<b>36.8</b>	<b>20.2</b>	86.5 U
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	67.7 U	47 U	3.84 U	5.13 U	3.84 U	1.54 U	1.54 U	135 U
1,2-Dichlorobenzene	UG/M3	53 U	36.8 U	3.01 U	4.01 U	3.01 U	1.2 U	1.2 U	106 U
1,2-Dichloroethane	UG/M3	35.7 U	24.8 U	2.02 U	2.7 U	2.02 U	0.809 U	0.809 U	71.2 U
1,2-Dichloropropane	UG/M3	40.7 U	28.3 U	2.31 U	3.08 U	2.31 U	0.924 U	0.924 U	81.3 U
1,2-Dichlorotetrafluoroethane	UG/M3	61.6 U	42.8 U	3.49 U	4.66 U	3.49 U	1.4 U	1.4 U	123 U
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	43.3 U	30.1 U	2.46 U	3.28 U	2.46 U	<b>9.09</b>	<b>4.87</b>	86.5 U
1,3-Butadiene	UG/M3	19.5 U	13.5 U	1.11 U	1.48 U	1.11 U	0.442 U	0.442 U	38.9 U
1,3-Dichlorobenzene	UG/M3	53 U	36.8 U	3.01 U	4.01 U	3.01 U	1.2 U	1.2 U	106 U
1,4-Dichlorobenzene	UG/M3	53 U	36.8 U	3.01 U	4.01 U	3.01 U	<b>2.04</b>	<b>1.39</b>	106 U
1,4-Dioxane (P-Dioxane)	UG/M3	31.7 U	22.1 U	1.8 U	2.4 U	1.8 U	0.721 U	0.721 U	63.4 U
2,2,4-Trimethylpentane	UG/M3	41.1 U	28.6 U	2.34 U	3.12 U	2.34 U	<b>3.36</b>	<b>1.49</b>	82.2 U
2-Hexanone	UG/M3	36.1 U	25.1 U	2.05 U	2.73 U	2.05 U	0.82 U	0.82 U	72.1 U
4-Ethyltoluene	UG/M3	43.3 U	30.1 U	2.46 U	3.28 U	2.46 U	<b>6.54</b>	<b>3.46</b>	86.5 U
Acetone	UG/M3	105 U	72.7 U	<b>22.8</b>	<b>16</b>	<b>7.89</b>	<b>53.9</b>	<b>30.4</b>	209 U
Allyl Chloride (3-Chloropropene)	UG/M3	27.6 U	19.2 U	1.57 U	2.09 U	1.57 U	0.626 U	0.626 U	55.1 U
Benzene	UG/M3	28.1 U	19.6 U	1.6 U	2.13 U	1.6 U	<b>1.91</b>	<b>1.48</b>	56.2 U
Benzyl Chloride	UG/M3	45.6 U	31.7 U	2.59 U	3.45 U	2.59 U	1.04 U	1.04 U	91.1 U
Bromodichloromethane	UG/M3	59 U	41 U	3.35 U	4.47 U	3.35 U	1.34 U	1.34 U	118 U
Bromoform	UG/M3	91.1 U	63.3 U	5.17 U	6.9 U	5.17 U	2.07 U	2.07 U	182 U
Bromomethane	UG/M3	34.2 U	23.8 U	1.94 U	2.59 U	1.94 U	0.777 U	0.777 U	68.3 U
Carbon Disulfide	UG/M3	27.4 U	19.1 U	1.56 U	2.08 U	1.56 U	<b>8.1</b>	0.623 U	54.8 U
Carbon Tetrachloride	UG/M3	55.4 U	38.5 U	3.15 U	4.2 U	3.15 U	1.26 U	1.26 U	111 U
Chlorobenzene	UG/M3	40.6 U	28.2 U	2.3 U	3.07 U	2.3 U	0.921 U	0.921 U	81.1 U
Chloroethane	UG/M3	23.2 U	16.1 U	1.32 U	1.76 U	1.32 U	0.528 U	0.528 U	46.4 U
Chloroform	UG/M3	43 U	29.9 U	<b>2.68 JV</b>	3.26 UJV	<b>3.57</b>	<b>3.59</b>	<b>1.41</b>	85.9 U

**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		SV-1	SV-2	SV-3	SV-3	SV-4	SV-5	SV-6	SV-7
Sample Date:		03/22/2016	03/22/2016	03/22/2016	03/22/2016	03/22/2016	11/02/2016	11/02/2016	11/04/2016
Normal Sample or Field Duplicate:		N	N	N	FD	N	N	N	N
Parameter	Unit								
Chloromethane	UG/M3	18.2 U	12.6 U	1.03 U	1.38 U	1.03 U	0.413 U	0.413 U	36.3 U
Cis-1,2-Dichloroethylene	UG/M3	<b>603</b>	<b>338</b>	<b>11.4</b>	<b>11.9</b>	<b>16.2</b>	<b>2.94</b>	<b>78.5</b>	<b>1130</b>
Cis-1,3-Dichloropropene	UG/M3	40 U	27.8 U	2.27 U	3.03 U	2.27 U	0.908 U	0.908 U	79.9 U
Cyclohexane	UG/M3	30.3 U	21.1 U	1.72 UJV	<b>4.44 JV</b>	1.72 U	<b>0.73</b>	0.688 U	<b>60.9</b>
Dibromochloromethane	UG/M3	75.1 U	52.1 U	4.26 U	5.68 U	4.26 U	1.7 U	1.7 U	150 U
Dichlorodifluoromethane	UG/M3	43.6 U	30.3 U	2.47 U	3.3 U	2.47 U	<b>1.62</b>	<b>1.77</b>	87 U
Ethanol	UG/M3	<b>577</b>	288 U	<b>153</b>	<b>125</b>	<b>74.1</b>	<b>12.7</b>	9.42 U	829 U
Ethyl Acetate	UG/M3	79.3 U	55.1 U	4.5 U	6.02 U	4.5 U	<b>1.99</b>	1.8 U	159 U
Ethylbenzene	UG/M3	38.3 U	26.6 U	2.17 U	2.9 U	2.17 U	<b>6.21</b>	<b>3.61</b>	76.4 U
Hexachlorobutadiene	UG/M3	94 U	65.3 U	5.33 U	7.11 U	5.33 U	2.13 U	2.13 U	188 U
Isopropanol	UG/M3	54.1 U	37.6 U	<b>5.75 JV</b>	4.1 UJV	3.07 U	<b>4.92</b>	<b>4.99</b>	108 U
m,p-Xylene	UG/M3	76.4 U	53 U	<b>4.95 JV</b>	5.78 UJV	<b>5.78</b>	<b>29.3</b>	<b>16.4</b>	153 U
Methyl Ethyl Ketone (2-Butanone)	UG/M3	64.9 U	45.1 U	3.69 U	4.93 U	3.69 U	<b>4.39</b>	<b>2.63</b>	130 U
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	90.2 U	62.7 U	5.12 U	6.84 U	5.12 U	2.05 U	2.05 U	180 U
Methylene Chloride	UG/M3	76.4 U	53.2 U	4.34 U	5.8 U	4.34 U	1.74 U	1.74 U	153 U
N-Heptane	UG/M3	36.1 U	25.1 U	2.05 U	2.73 U	2.05 U	<b>2.66</b>	<b>1.33</b>	72.1 U
N-Hexane	UG/M3	31 U	21.6 U	1.76 U	2.35 U	1.76 U	<b>4.86</b>	0.705 U	62 U
O-Xylene (1,2-Dimethylbenzene)	UG/M3	38.3 U	26.6 U	2.17 U	2.9 U	2.17 U	<b>16.9</b>	<b>9.51</b>	76.4 U
Styrene	UG/M3	37.5 U	26.1 U	2.13 U	2.84 U	2.13 U	0.852 U	0.852 U	74.9 U
Tert-Butyl Alcohol	UG/M3	66.7 U	46.4 U	3.79 U	5.06 U	3.79 U	<b>13.6</b>	<b>8.79</b>	133 U
Tert-Butyl Methyl Ether	UG/M3	31.8 U	22.1 U	1.8 U	2.4 U	1.8 U	0.721 U	0.721 U	63.5 U
Tetrachloroethylene (PCE)	UG/M3	<b>18800</b>	<b>14200</b>	<b>1080</b>	<b>1500</b>	<b>1170</b>	<b>4.23</b>	<b>314</b>	<b>30700</b>
Tetrahydrofuran	UG/M3	64.9 U	45.1 U	3.69 U	4.93 U	3.69 U	1.47 U	1.47 U	130 U
Toluene	UG/M3	33.2 U	23.1 U	<b>3.25 JV</b>	2.51 UJV	<b>3.84</b>	<b>10.4</b>	<b>6.48</b>	66.3 U
Trans-1,2-Dichloroethene	UG/M3	34.9 U	24.3 U	1.98 U	2.64 U	1.98 U	0.793 U	<b>0.987</b>	69.8 U
Trans-1,3-Dichloropropene	UG/M3	40 U	27.8 U	2.27 U	3.03 U	2.27 U	0.908 U	0.908 U	79.9 U
Trichloroethylene (TCE)	UG/M3	<b>1280</b>	<b>763</b>	<b>59.1</b>	<b>66.6</b>	<b>67.7</b>	<b>12.5</b>	<b>114</b>	<b>2600</b>
Trichlorofluoromethane	UG/M3	49.5 U	34.4 U	2.81 U	3.75 U	2.81 U	<b>1.47</b>	<b>1.28</b>	98.9 U
Vinyl Bromide	UG/M3	38.5 U	26.8 U	2.19 U	2.92 U	2.19 U	0.874 U	0.874 U	77 U
Vinyl Chloride	UG/M3	22.5 U	15.6 U	1.28 U	1.71 U	1.28 U	0.511 U	0.511 U	45 U

**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		SV-8	SV-8	SV-9	SV-10	SV-11
Sample Date:		11/02/2016	11/02/2016	11/02/2016	03/21/2017	03/21/2017
Normal Sample or Field Duplicate:		N	FD	N	N	N
Parameter	Unit					
1,1,1-Trichloroethane (TCA)	UG/M3	2.18 U	2.73 U	1.09 U	1.09 U	1.09 U
1,1,2,2-Tetrachloroethane	UG/M3	2.75 U	3.43 U	1.37 U	1.37 U	1.37 U
1,1,2-Trichloro-1,2,2-Trifluoroethane	UG/M3	3.07 U	3.83 U	1.53 U	1.53 U	1.53 U
1,1,2-Trichloroethane	UG/M3	2.18 U	2.73 U	1.09 U	1.09 U	1.09 U
1,1-Dichloroethane	UG/M3	1.62 U	2.02 U	0.809 U	0.809 U	0.809 U
1,1-Dichloroethene	UG/M3	1.59 U	1.98 U	0.793 U	0.793 U	0.793 U
1,2,4-Trichlorobenzene	UG/M3	2.97 U	3.71 U	1.48 U	1.48 U	1.48 U
1,2,4-Trimethylbenzene	UG/M3	<b>42.8</b>	<b>42.9</b>	<b>82.6</b>	0.983 U	0.983 U
1,2-Dibromoethane (Ethylene Dibromide)	UG/M3	3.07 U	3.84 U	1.54 U	1.54 U	1.54 U
1,2-Dichlorobenzene	UG/M3	2.4 U	3.01 U	1.2 U	1.2 U	1.2 U
1,2-Dichloroethane	UG/M3	1.62 U	2.02 U	0.809 U	0.809 U	0.809 U
1,2-Dichloropropane	UG/M3	1.85 U	2.31 U	0.924 U	0.924 U	0.924 U
1,2-Dichlorotetrafluoroethane	UG/M3	2.8 U	3.49 U	1.4 U	1.4 U	1.4 U
1,3,5-Trimethylbenzene (Mesitylene)	UG/M3	<b>11.1</b>	<b>10.7</b>	<b>22.7</b>	0.983 U	0.983 U
1,3-Butadiene	UG/M3	0.885 U	1.11 U	0.442 U	<b>0.471</b>	0.442 U
1,3-Dichlorobenzene	UG/M3	2.4 U	3.01 U	1.2 U	1.2 U	1.2 U
1,4-Dichlorobenzene	UG/M3	<b>2.86</b>	<b>3.31</b>	<b>3.1</b>	1.2 U	1.2 U
1,4-Dioxane (P-Dioxane)	UG/M3	1.44 U	1.8 U	0.721 U	0.721 U	0.721 U
2,2,4-Trimethylpentane	UG/M3	<b>4.14 JV</b>	2.34 UJV	<b>20.6</b>	<b>5.79</b>	0.934 U
2-Hexanone	UG/M3	1.64 U	2.05 U	0.82 U	<b>1.25</b>	0.82 U
4-Ethyltoluene	UG/M3	<b>7.67</b>	<b>6.78</b>	<b>12.5</b>	0.983 U	0.983 U
Acetone	UG/M3	<b>32.3</b>	<b>22</b>	<b>33.3</b>	<b>26.6</b>	<b>29.5</b>
Allyl Chloride (3-Chloropropene)	UG/M3	1.25 U	1.57 U	0.626 U	0.626 U	0.626 U
Benzene	UG/M3	<b>1.8</b>	1.6 U	<b>1.9</b>	<b>1.12</b>	0.639 U
Benzyl Chloride	UG/M3	2.07 U	2.59 U	1.04 U	1.04 U	1.04 U
Bromodichloromethane	UG/M3	2.68 U	3.35 U	1.34 U	1.34 U	1.34 U
Bromoform	UG/M3	4.14 U	5.17 U	2.07 U	2.07 U	2.07 U
Bromomethane	UG/M3	1.55 U	1.94 U	0.777 U	0.777 U	0.777 U
Carbon Disulfide	UG/M3	<b>4.76</b>	<b>4.48</b>	<b>3.61</b>	<b>0.906</b>	0.623 U
Carbon Tetrachloride	UG/M3	2.52 U	3.15 U	1.26 U	1.26 U	1.26 U
Chlorobenzene	UG/M3	1.84 U	2.3 U	0.921 U	0.921 U	0.921 U
Chloroethane	UG/M3	1.06 U	1.32 U	0.528 U	0.528 U	0.528 U
Chloroform	UG/M3	1.95 U	2.44 U	<b>0.982</b>	<b>1.51</b>	0.977 U

**Table 1. Summary of Volatile Organic Compounds in Air and Soil Vapor, Morton Village Plaza, Plainview, New York**

Sample Designation:		SV-8	SV-8	SV-9	SV-10	SV-11
Sample Date:		11/02/2016	11/02/2016	11/02/2016	03/21/2017	03/21/2017
Normal Sample or Field Duplicate:		N	FD	N	N	N
Parameter	Unit					
Chloromethane	UG/M3	0.826 U	1.03 U	0.413 U	0.413 U	0.413 U
Cis-1,2-Dichloroethylene	UG/M3	1.59 U	1.98 U	0.793 U	0.793 U	0.793 U
Cis-1,3-Dichloropropene	UG/M3	1.82 U	2.27 U	0.908 U	0.908 U	0.908 U
Cyclohexane	UG/M3	1.38 U	1.72 U	<b>1.81</b>	<b>0.888</b>	0.688 U
Dibromochloromethane	UG/M3	3.41 U	4.26 U	1.7 U	1.7 U	1.7 U
Dichlorodifluoromethane	UG/M3	<b>2.23</b>	2.47 U	<b>2.03</b>	<b>1.51</b>	<b>1.28</b>
Ethanol	UG/M3	18.8 U	23.6 U	<b>13.4</b>	<b>16.6</b>	9.42 U
Ethyl Acetate	UG/M3	3.6 U	4.5 U	<b>2.11</b>	1.8 U	1.8 U
Ethylbenzene	UG/M3	<b>8.12</b>	<b>5.52</b>	<b>13.1</b>	<b>1.26</b>	0.869 U
Hexachlorobutadiene	UG/M3	4.27 U	5.33 U	2.13 U	2.13 U	2.13 U
Isopropanol	UG/M3	<b>7.55 JV</b>	<b>3.07 JV</b>	<b>9</b>	<b>8.75</b>	1.23 U
m,p-Xylene	UG/M3	<b>35.6</b>	<b>26.1</b>	<b>58.6</b>	<b>3.64</b>	<b>2.47</b>
Methyl Ethyl Ketone (2-Butanone)	UG/M3	<b>4.01 JV</b>	3.69 UJV	<b>4.1</b>	<b>4.95</b>	<b>4.48</b>
Methyl Isobutyl Ketone (4-Methyl-2-Pentanone)	UG/M3	4.1 U	5.12 U	2.05 U	2.05 U	2.05 U
Methylene Chloride	UG/M3	3.47 U	4.34 U	1.74 U	1.74 U	1.74 U
N-Heptane	UG/M3	<b>5.12 JV</b>	2.05 UJV	<b>4.26</b>	<b>3.93</b>	0.82 U
N-Hexane	UG/M3	1.41 U	1.76 U	<b>2.01</b>	<b>2.48</b>	0.705 U
O-Xylene (1,2-Dimethylbenzene)	UG/M3	<b>21.6</b>	<b>15.2</b>	<b>42.8</b>	<b>1.24</b>	<b>1.28</b>
Styrene	UG/M3	1.7 U	2.13 U	<b>0.903</b>	0.852 U	0.852 U
Tert-Butyl Alcohol	UG/M3	<b>10.8</b>	<b>6.94</b>	<b>9.19</b>	<b>5.27</b>	<b>5.7</b>
Tert-Butyl Methyl Ether	UG/M3	1.44 U	1.8 U	0.721 U	0.721 U	0.721 U
Tetrachloroethylene (PCE)	UG/M3	<b>649 JV</b>	<b>1150 JV</b>	<b>342</b>	1.36 U	<b>11.7</b>
Tetrahydrofuran	UG/M3	2.95 U	3.69 U	1.47 U	1.47 U	1.47 U
Toluene	UG/M3	<b>13.9</b>	<b>10.4</b>	<b>17.8</b>	<b>4.52</b>	<b>3.18</b>
Trans-1,2-Dichloroethene	UG/M3	1.59 U	1.98 U	0.793 U	0.793 U	0.793 U
Trans-1,3-Dichloropropene	UG/M3	1.82 U	2.27 U	0.908 U	0.908 U	0.908 U
Trichloroethylene (TCE)	UG/M3	<b>5.75</b>	<b>6.99</b>	<b>11.2</b>	1.07 U	1.07 U
Trichlorofluoromethane	UG/M3	2.25 U	2.81 U	<b>1.47</b>	<b>1.19</b>	<b>1.32</b>
Vinyl Bromide	UG/M3	1.75 U	2.19 U	0.874 U	0.874 U	0.874 U
Vinyl Chloride	UG/M3	1.02 U	1.28 U	0.511 U	0.511 U	0.511 U

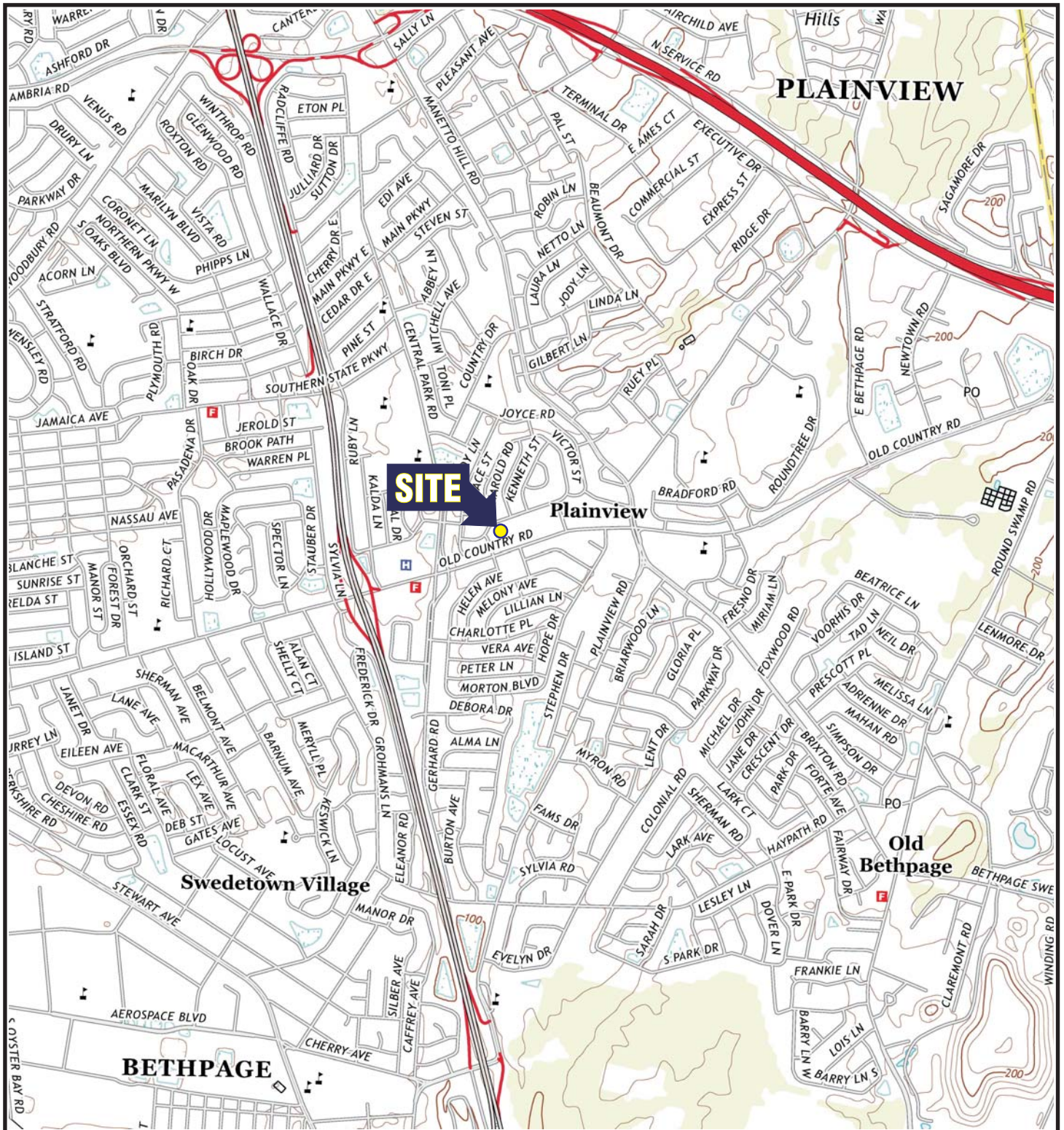
**Interim Remedial Measure Work Plan**  
***Morton Village Plaza Shopping Center***

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**FIGURES**

1. Site Location Map
2. Sample Locations





# QUADRANGLE LOCATION



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



0 2000'

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

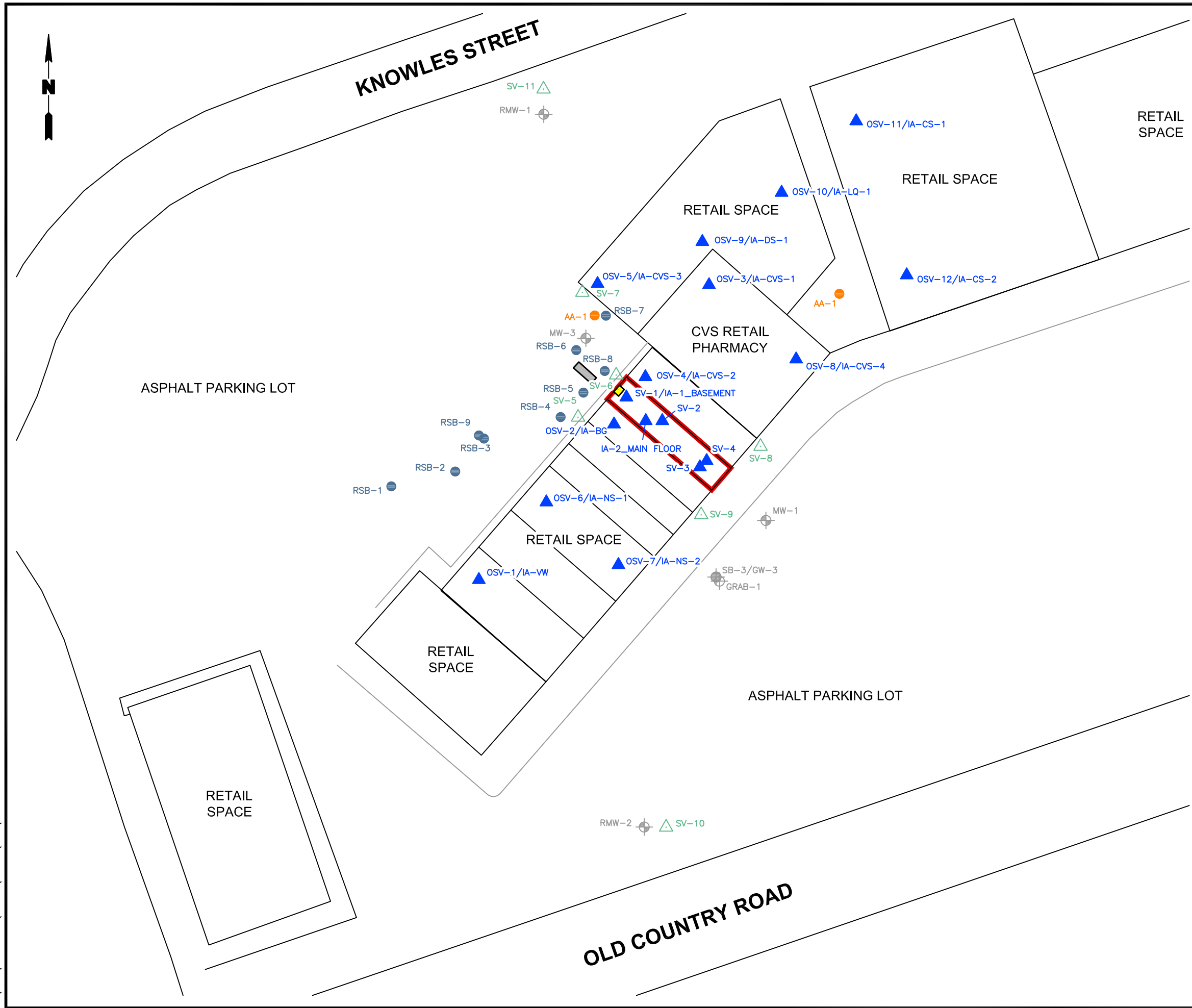
Compiled by: J.W.	Date: 05JAN14
Prepared by: J.A.D.	Scale: AS SHOWN
Project Mgr.: J.W.	Project No.: 2517.0001Y000
File: 2517.0001Y101.01.CDR	

FIGURE

1



V:\CAD\PROJECTS\2517\0001Y\118\2517.0001Y118.01.DWG

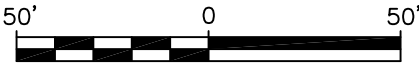


#### LEGEND

- 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 GRAB SAMPLE INSTALLED BY HRP ASSOCIATES IN 2010
- RSB-1 LOCATION AND DESIGNATION OF SOIL BORING
- RMW-1 LOCATION AND DESIGNATION OF UP-GRAIDENT MONITORING WELL
- GRAB-1 LOCATION AND DESIGNATION OF GROUNDWATER GRAB SAMPLE
- SV-2 LOCATION AND DESIGNATION OF SUB-SLAB SOIL VAPOR AND INDOOR AIR SAMPLE
- SV-5 LOCATION AND DESIGNATION OF SOIL VAPOR MONITORING POINT
- AA-1 LOCATION AND DESIGNATION OF OUTDOOR AMBIENT AIR SAMPLE
- APPROXIMATE LOCATION OF FORMER UST
- APPROXIMATE LOCATION OF FORMER SUMP
- FORMER MORTON VILLAGE CLEANERS LOCATION

#### SOURCE

HRP ASSOCIATES, INC., SITE CHARACTERIZATION REPORT  
AUGUST 2011.



Title:			
SAMPLE LOCATIONS			
1022 OLD COUNTRY ROAD PLAINVIEW, NEW YORK			
Prepared For:			
MORTON VILLAGE REALTY CO., INC.			
	Compiled by: J.W.	Date: 23MAY18	FIGURE <b>2</b>
	Prepared by: G.M.	Scale: AS SHOWN	
	Project Mgr: J.W.	Project: 2517.0001Y000	
	File: 2517.0001Y118.01.DWG		

**Interim Remedial Measure Work Plan**  
***Morton Village Plaza Shopping Center***

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**APPENDICES**

- A. New York State Department of Health Soil Vapor/Indoor Air Matrices
- B. Sub-Slab Depressurization System Design Drawings
- C. Division of Air Resources (DAR 1) Screening Analysis
- D. Sub-Slab Depressurization System Component Specifications
- E. Sub-Slab Depressurization System Operations and Maintenance Log
- F. Health and Safety Plan

**Interim Remedial Measure Work Plan**  
***Morton Village Plaza Shopping Center***

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**APPENDIX A**

New York State Department of Health Soil Vapor/Indoor Air Matrices

# Soil Vapor/Indoor Air Matrix A

May 2017

## Analytes Assigned:

Trichloroethene (TCE), *cis*-1,2-Dichloroethene (c12-DCE), 1,1-Dichloroethene (11-DCE), Carbon Tetrachloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )		
	< 0.2	0.2 to < 1	1 and above
< 6	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	4. No further action	5. MONITOR	6. MITIGATE
60 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

**No further action:** No additional actions are recommended to address human exposures.

**Identify Source(s) and Resample or Mitigate:** We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

**Monitor:** We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

**Mitigate:** We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

## ADDITIONAL NOTES FOR MATRIX A

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This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

- [1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).
- [2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.
- [3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 0.20 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.
- [4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.
- [5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.
- [6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

# Soil Vapor/Indoor Air Matrix B

May 2017

**Analytes Assigned:**

Tetrachloroethene (PCE), 1,1,1-Trichloroethane (111-TCA), Methylene Chloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )		
	< 3	3 to < 10	10 and above
< 100	1. No further action	2. No Further Action	3. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
100 to < 1,000	4. No further action	5. MONITOR	6. MITIGATE
1,000 and above	7. MITIGATE	8. MITIGATE	9. MITIGATE

**No further action:** No additional actions are recommended to address human exposures.

**Identify Source(s) and Resample or Mitigate:** We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

**Monitor:** We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

**Mitigate:** We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.

## ADDITIONAL NOTES FOR MATRIX B

---

This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

- [1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).
- [2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.
- [3] Appropriate care should be taken during all aspects of sample collection to ensure that high quality data are obtained. Since the data are being used in the decision-making process, the laboratory analyzing the environmental samples must have current Environmental Laboratory Approval Program (ELAP) certification for the appropriate analyte and environmental matrix combinations. Furthermore, samples should be analyzed by methods that can achieve a minimum reporting limit of 1 microgram per cubic meter for indoor and outdoor air samples. For sub-slab vapor samples and dirt floor soil vapor samples, a minimum reporting limit of 1 microgram per cubic meter is recommended.
- [4] Sub-slab vapor and indoor air samples are typically collected when the likelihood of soil vapor intrusion is considered to be the greatest (i.e., worst-case conditions). If samples are collected at other times (typically, samples collected outside of the heating season), then resampling during worst-case conditions might be appropriate to verify that actions taken to address exposures related to soil vapor intrusion are protective of human health.
- [5] When current exposures are attributed to sources other than soil vapor intrusion, the agencies should be given documentation (e.g., applicable environmental data, completed indoor air sampling questionnaire, digital photographs, etc.) to support a proposed action other than that provided in the matrix box and to support agency assessment and follow-up.
- [6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

# Soil Vapor/Indoor Air Matrix C

May 2017

## Analytes Assigned:

Vinyl Chloride

SUB-SLAB VAPOR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )	INDOOR AIR CONCENTRATION of COMPOUND (mcg/m <sup>3</sup> )	
	< 0.2	0.2 and above
< 6	1. No further action	2. IDENTIFY SOURCE(S) and RESAMPLE or MITIGATE
6 to < 60	3. MONITOR	4. MITIGATE
60 and above	5. MITIGATE	6. MITIGATE

**No further action:** No additional actions are recommended to address human exposures.

**Identify Source(s) and Resample or Mitigate:** We recommend that reasonable and practical actions be taken to identify the source(s) affecting the indoor air quality and that actions be implemented to reduce indoor air concentrations to within background ranges. For example, if an indoor or outdoor air source is identified, we recommend the appropriate party implement actions to reduce the levels. In the event that indoor or outdoor sources are not readily identified or confirmed, resampling (which might include additional sub-slab vapor and indoor air sampling locations) is recommended to demonstrate that SVI mitigation actions are not needed. Based on the information available, mitigation might also be recommended when soil vapor intrusion cannot be ruled out.

**Monitor:** We recommend monitoring (sampling on a recurring basis), including but not necessarily limited to sub-slab vapor, basement air and outdoor air sampling, to determine whether concentrations in the indoor air or sub-slab vapor have changed and/or to evaluate temporal influences. Monitoring might also be recommended to determine whether existing building conditions (e.g., positive pressure heating, ventilation and air-conditioning systems) are maintaining the desired mitigation endpoint and to determine whether changes are needed. The type and frequency of monitoring is determined based on site-, building- and analyte-specific information, taking into account applicable environmental data and building operating conditions. Monitoring is an interim measure required to evaluate exposures related to soil vapor intrusion until contaminated environmental media are remediated.

**Mitigate:** We recommend mitigation to minimize current or potential exposures associated with soil vapor intrusion. The most common mitigation methods are sealing preferential pathways in conjunction with installing a sub-slab depressurization system and changing the pressurization of the building in conjunction with monitoring. The type, or combination of types, of mitigation is determined on a building-specific basis, taking into account building construction and operating conditions. Mitigation is considered a temporary measure implemented to address exposures related to soil vapor intrusion until contaminated environmental media are remediated.

These general recommendations are made with consideration being given to the additional notes on page 2.



## ADDITIONAL NOTES FOR MATRIX C

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This matrix summarizes actions recommended to address current and potential exposures related to soil vapor intrusion. To use the matrix appropriately as a tool in the decision-making process, the following should be noted:

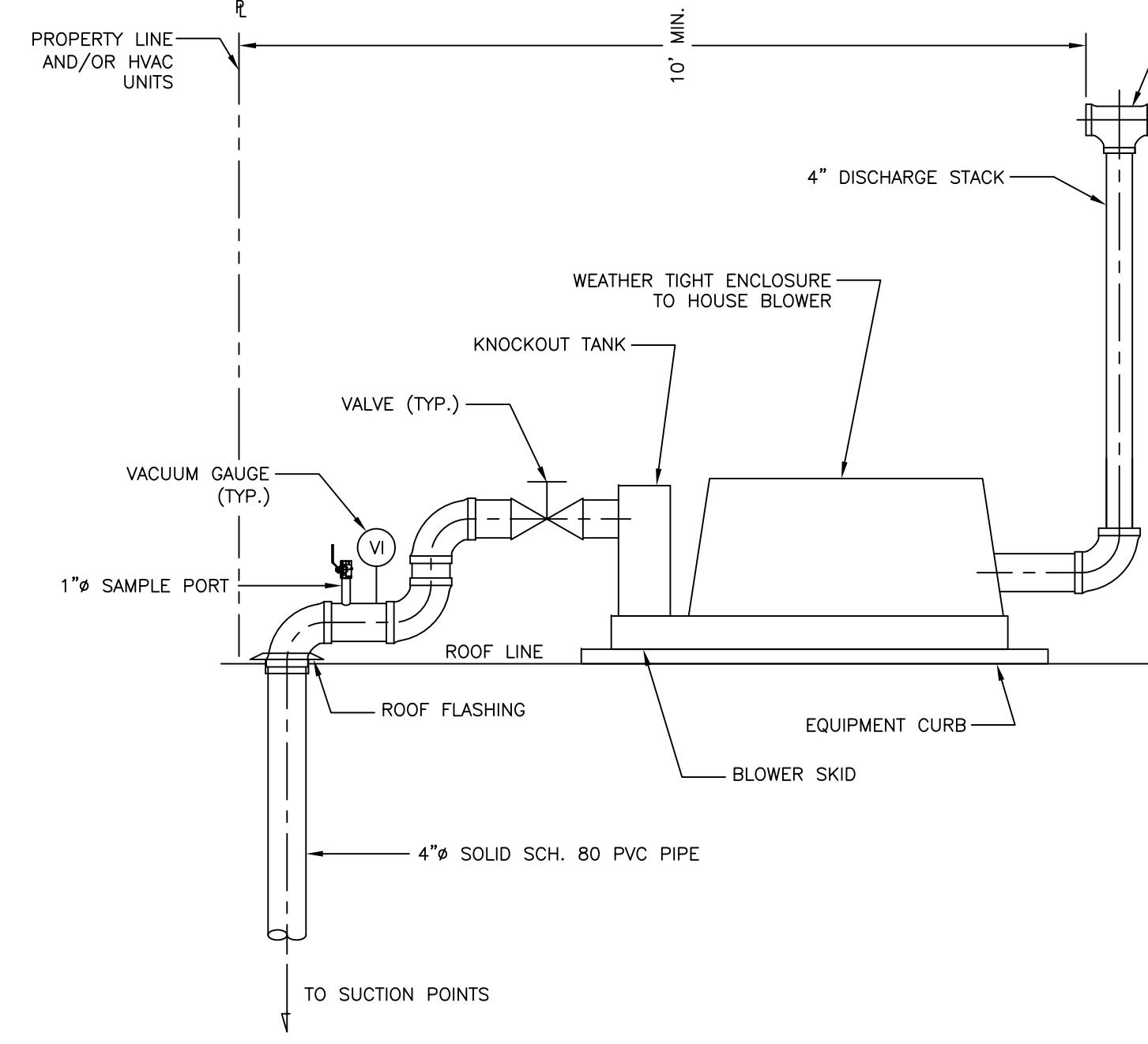
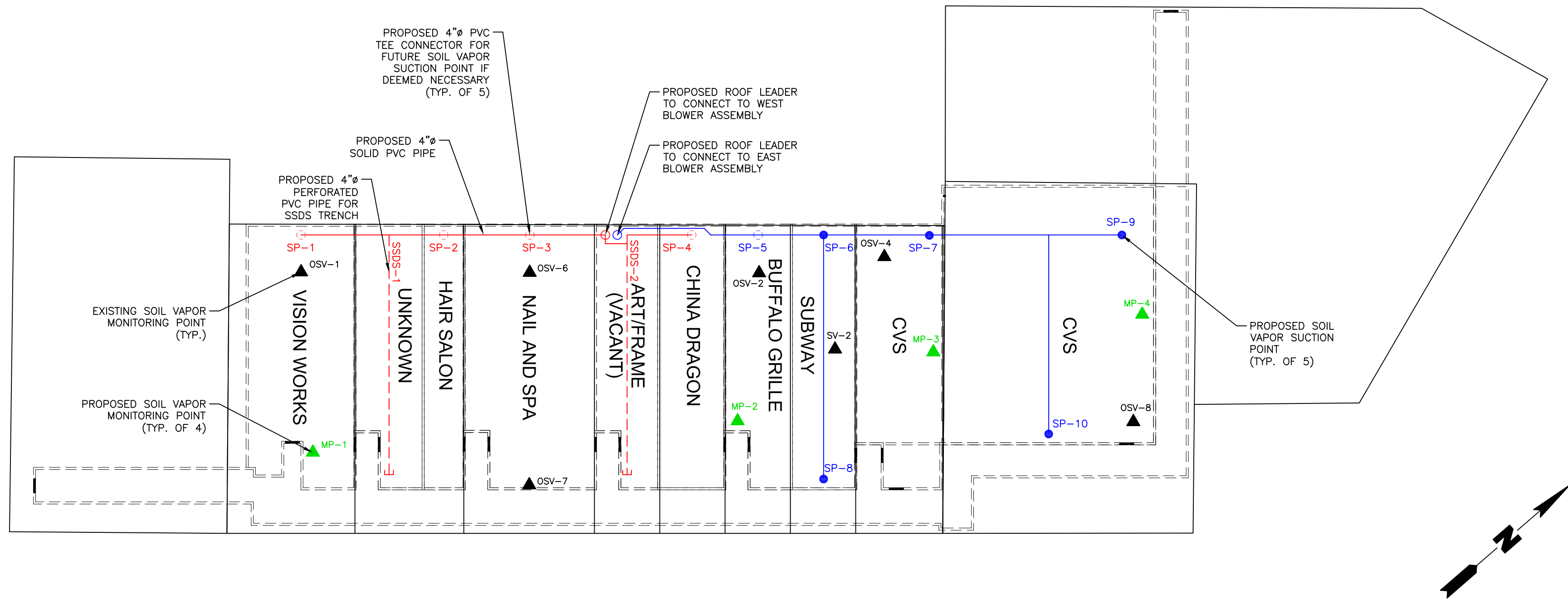
- [1] The matrix is generic. As such, it may be appropriate to modify a recommended action to accommodate analyte-specific, building-specific conditions (e.g., dirt floor in basement, crawl spaces, thick slabs, current occupancy, etc.), and/or factors provided in Section 3.2 of the guidance (e.g., current land use, environmental conditions, etc.). For example, collection of additional samples may be recommended when the matrix indicates "no further action" for a particular building, but the results of adjacent buildings (especially sub-slab vapor results) indicate a need to take actions to address exposures related to soil vapor intrusion. Mitigation might be recommended when the results of multiple contaminants indicate monitoring is recommended. Proactive actions may be proposed at any time. For example, the party implementing the actions may decide to install sub-slab depressurization systems on buildings where the matrix indicates "no further action" or "monitoring." Such an action might be undertaken for reasons other than public health (e.g., seeking community acceptance, reducing costs, etc.). However, actions implemented *in lieu* of sampling will typically be expected to be captured in the final engineering report and site management plan, and might not rule out the need for post-implementation sampling (e.g., to document effectiveness or to support terminating the action).
- [2] Actions provided in the matrix are specific to addressing human exposures. Implementation of these actions does not preclude investigating possible sources of soil vapor contamination, nor does it preclude remediating contaminated soil vapor or the source of soil vapor contamination.
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- [6] The party responsible for implementing the recommended actions will differ depending upon several factors, including but not limited to the following: the identified source of the volatile chemicals, the environmental remediation program, and analyte-specific, site-specific and building-specific factors.

**Interim Remedial Measure Work Plan**  
***Morton Village Plaza Shopping Center***

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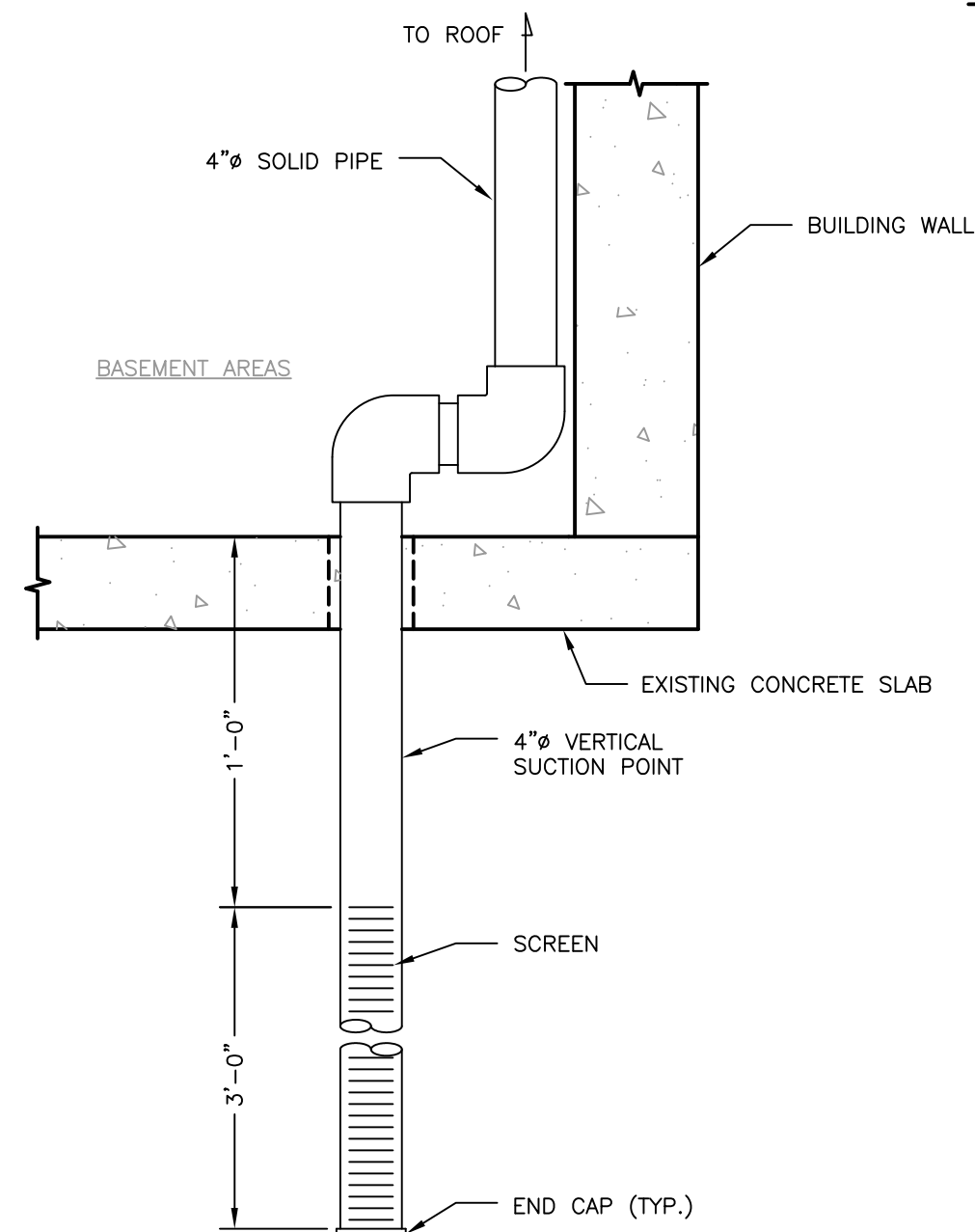
**APPENDIX B**

Sub-Slab Depressurization System Design Drawings



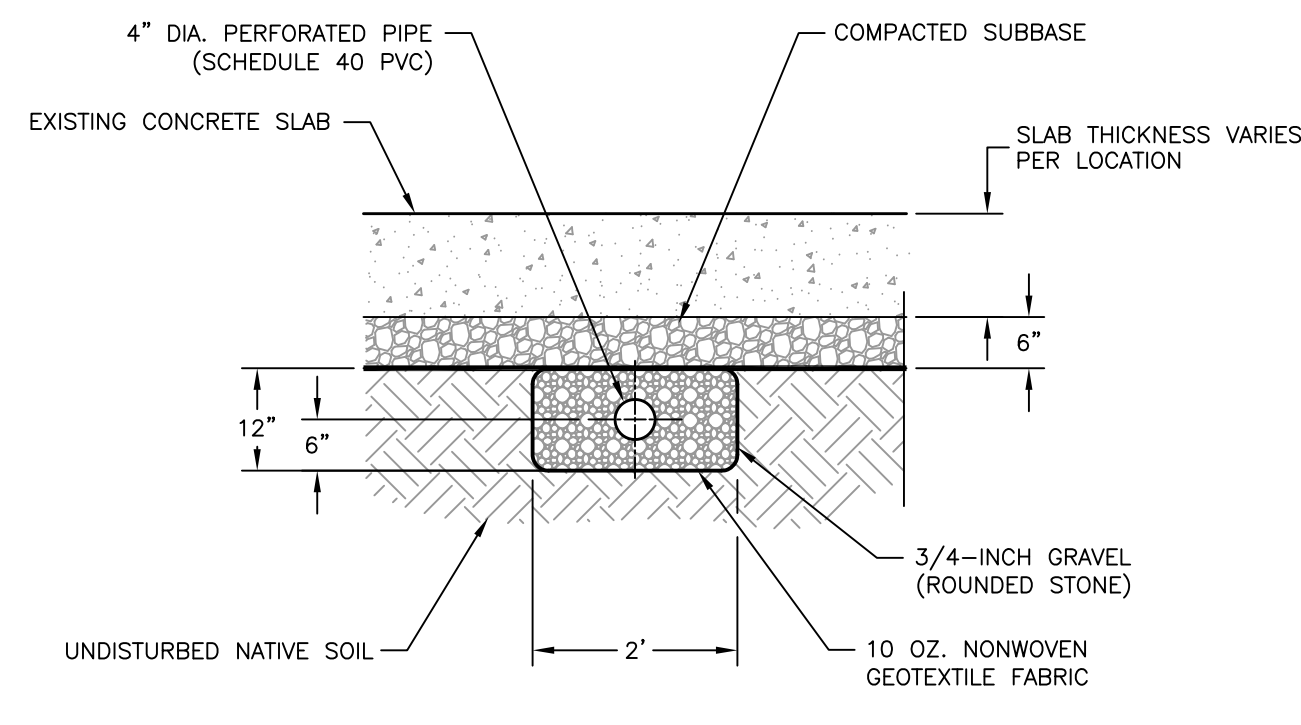
- BLOWER NOTES**
1. PROVIDE ELECTRICAL/CONTROL CONDUIT TO BLOWERS. COORDINATE WITH ELECTRICAL CONTRACTOR.
  2. ELECTRICAL CONDUIT SHALL BE SIZED FOR 115/230 VOLT, SINGLE PHASE, 30 AMPS 60 HZ, FOR EACH BLOWER MOTOR.
  3. THE BLOWER DISCHARGES SHALL BE LOCATED A MINIMUM OF 10 FEET FROM HVAC AIR INLETS, AND PROPERTY LINE.
  4. THE BLOWERS SHALL BE A 5.5 HP, AMETEK ROTRON MODEL EN757FL5MWL OR APPROVED EQUAL.
  5. THE BLOWERS SHALL BE PROVIDED WITH A WEATHER TIGHT ENCLOSURE GASHO ALUMINUM CUSTOM ENCLOSURE OR APPROVED EQUAL.
  6. THE BLOWER SKIDS SHALL INCLUDE WEATHER TIGHT ENCLOSURE, PLASTIC KNOCKOUT TANK (WITH HIGH LEVEL ALARM), VACUUM RELIEF VALVE, LOW VACUUM SWITCH, GAUGES, AND INTERCONNECTING PIPING/FITTINGS.
  7. A CONTROL PANEL SHALL BE PROVIDED WITH THE BLOWER SKIDS. THE CONTROL PANEL SHALL HAVE GREEN OPERATING LIGHTS AND RED ALARM LIGHTS. THE CONTROL PANEL SHALL HAVE AN ALARM FOR WATER LEVEL IN KNOCKOUT TANK, LOW VACUUM AND NO POWER. THE ALARM SIGNAL SHALL BE SENT TO AN APPROPRIATE LOCATION IN THE PROPOSED BUILDING (I.E., SUPERINTENDENT'S OFFICE) AND SHALL ALSO BE AUDIBLE.
  8. BLOWER SHALL BE PROVIDED WITH A REMOTE ALARM CAPABLE OF ALERTING THE OWNER OF A SYSTEM SHUTDOWN OR LOW VACUUM CONDITION VIA PHONE OR TEXT MESSAGE.
  9. PROVIDE ALL NECESSARY PIPE SUPPORTS FOR RISERS FROM THE BASEMENT SLAB TO THE BLOWERS ON THE ROOF.

**4 TYPICAL BLOWER DETAIL**  
SCALE: NOT TO SCALE



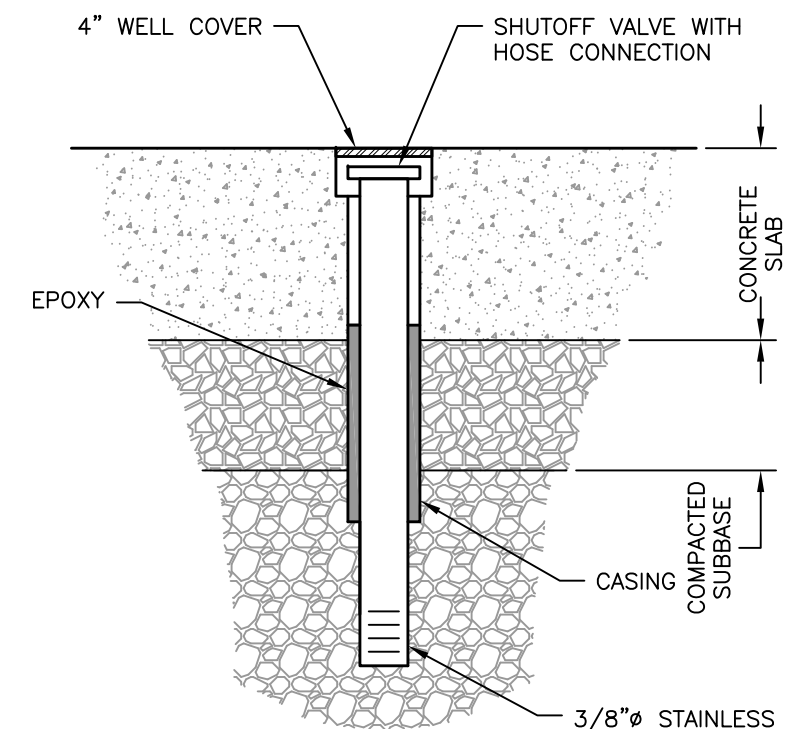
**1 TYPICAL VERTICAL SUCTON POINT DETAIL**  
SCALE: NOT TO SCALE

**SUB-SLAB DEPRESSURIZATION SYSTEM PLAN**  
SCALE: 1" = 20'

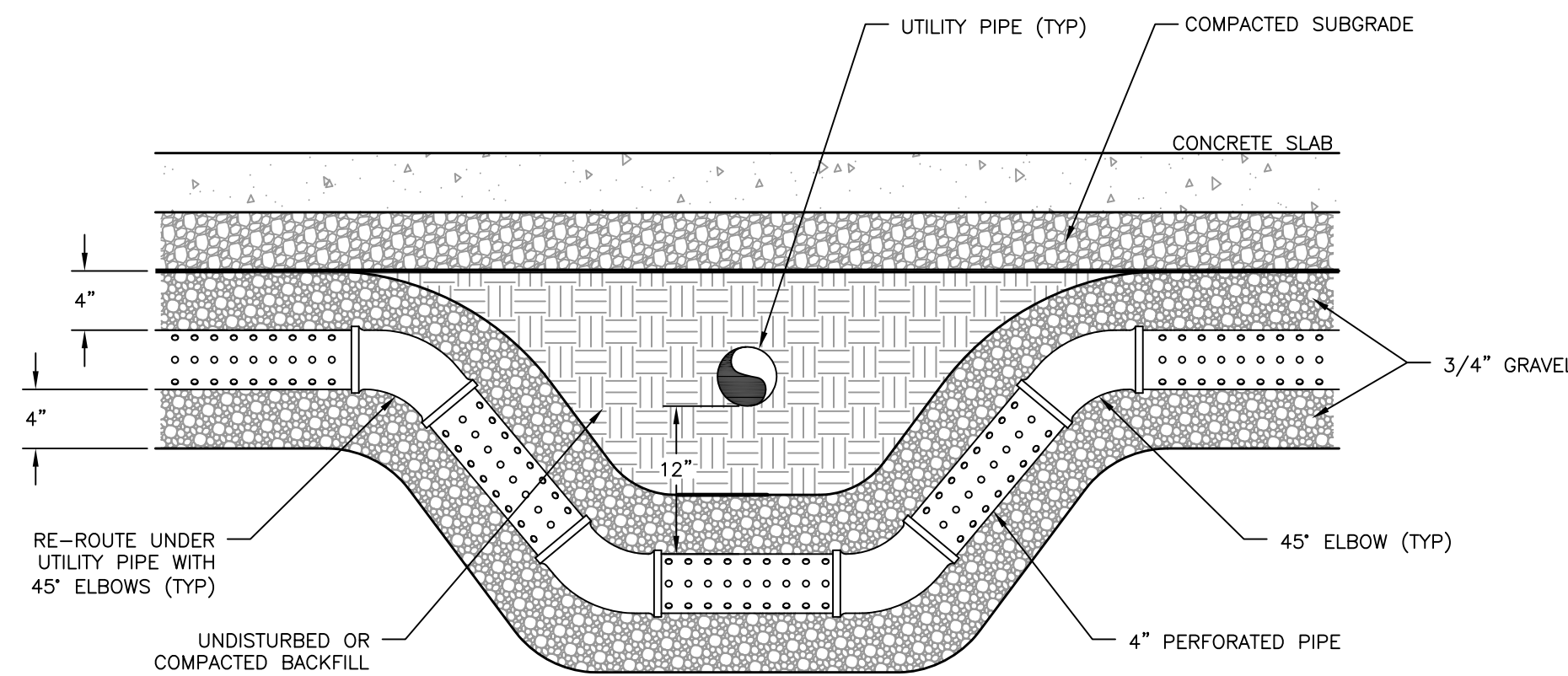


- SSDS PIPE NOTES**
1. CONTRACTOR SHALL COORDINATE WITH PLUMBING, MECHANICAL, CIVIL AND ELECTRICAL CONTRACTORS FOR ALL UTILITY CROSSINGS.
  2. THE PERFORATED PIPE MAY BE ROUTED AROUND OR UNDERNEATH ANY UTILITY LINES (SEWER, WATER, GAS), AS REQUIRED AND AS APPROVED BY THE ENGINEER.
  3. THE SURFACES TO BE LINED WITH GEOTEXTILE SHALL BE FREE OF ALL ROCKS, STONES, SHARP OBJECTS OR CONSTRUCTION DEBRIS OF ANY KIND.
  4. INSTALL GEOTEXTILE NONWOVEN FABRIC DIRECTLY ON FILL. MATERIAL OVERLAPS SHALL BE A MINIMUM OF 12" THE OVERLAPPED SEAMS WILL BE SEALED WITH TAPE.
  5. ALL PENETRATIONS THROUGH THE SLAB ON GRADE (SOG) SHALL BE SEALED USING A SILICONE BASED WATERPROOF SEALANT OR EQUIVALENT.

**2 SUB-SLAB DEPRESSURIZATION SYSTEM PIPE DETAIL**  
SCALE: NOT TO SCALE



**5 TYPICAL SOIL VAPOR MONITORING POINT DETAIL**  
SCALE: NOT TO SCALE



**3 TYPICAL UTILITY PIPE CROSSING**  
SCALE: NOT TO SCALE

V:\CAD\PROJECTS\2517\0001Y110\2517.0001Y110.02.DWG

NO.	DATE	REVISION DESCRIPTION	INT.

UNAUTHORIZED ALTERATION OR ADDITION TO THIS DOCUMENT IS A VIOLATION OF STATE LAW.

THESE DOCUMENTS (OR COPIES OF ANY THEREOF) PREPARED BY OR BEARING THE SEAL OF THE ENGINEER, SHALL NOT BE REUSED FOR ANY EXTENSIONS OF THE PROJECT OR ANY OTHER PROJECT WITHOUT THE WRITTEN CONSENT OF THE ENGINEER.

PROJ. ENGINEER: N.C.	DRAWN BY: D.E.K.
DESIGNED BY: D.E.K.	CHECKED BY: N.C.
DRAWING SCALE: AS SHOWN	PLOT SCALE: 1:1
DRAWING DATE: 13JUN18	PRINT TYPE: B&W
OFFICE: NY	PAPER SIZE: ARCH D
PROJECT NO.: 2517.0001Y000	
DRAWING FILE: 2517.0001Y110.02.DWG	

**ROUX**

Roux Environmental  
Engineering & Geology, D.P.C.  
209 SHAFTER STREET ISLANDIA NEW YORK 11749  
(631) 232-2600

PROJECT NAME:  
**MORTON VILLAGE REALTY CO., INC.**  
**1022 OLD COUNTRY ROAD, PLAINVIEW, NEW YORK**

PROJECT FOR:  
**MORTON VILLAGE REALTY CO., INC.**  
**1022 OLD COUNTRY ROAD, PLAINVIEW, NEW YORK**

TITLE: <b>SUB-SLAB DEPRESSURIZATION SYSTEM PLAN AND DETAILS</b>	DRAWING NO. <b>1</b> DRAWING 1 OF 1
--	--

**Interim Remedial Measure Work Plan**  
***Morton Village Plaza Shopping Center***

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**APPENDIX C**

Division of Air Resources (DAR 1) Screening Analysis

## Division of Air Resources (DAR-1) Screening Analysis

**Table 1. Morton Village DAR-1 Screening Level Worksheet**

998-1064 Old Country Road, Plainview, New York

Calculations based on maximum sub-slab sample results from the Former Cleaners, SV-1, 3/22/16 for PCE and OSV-4 on 3/21/17 for TCE and cis-12 DCE .

	$\mu\text{g}/\text{m}^3$	PPMv
Tetrachloroethene (PCE) concentration:	18,800	2.727
Trichloroethene (TCE) concentration:	1,300	0.238
Dichloroethene (DCE) concentration:	1,590	0.394

Air flow rate (cubic feet per minute [cfm]): 360

### Calculate Emission Rate in Pounds/Hour (lb/hr):

Flow Rate = 360 cfm

Emission Rate (lb/hr) = flow rate \* concentration (PPMv) \* molecular weight \*  $1.581\text{E}-07$

Note that  $1.581\text{E}-07 = 1/10^6 \text{ ppm-v} * 60 \text{ minutes/hour} * 1 \text{ lb-mole}/379.5 \text{ ft}^3$

Emission Rate for PCE (lb/hr) = 360 cfm * 2.727 PPMv * 165.8 * $1.581\text{E}-07$ =	<b>0.026 lb/hr or</b>	<b>225.4 lb/yr</b>
Emission Rate for TCE (lb/hr) = 360 cfm * 0.238 PPMv * 131.4 * $1.581\text{E}-07$ =	<b>0.002 lb/hr or</b>	<b>15.6 lb/yr</b>
Emission Rate for DCE (lb/hr) = 360 cfm * 0.394 PPMv * 97 * $1.581\text{E}-07$ =	<b>0.002 lb/hr or</b>	<b>19.1 lb/yr</b>

### Standard Point Source Method (Appendix B – Division of Air Resources):

Hs (Height of Stack) = 25' Hb (Height of Building) = 15'

Hs/Hb = 1.67 > 1.5 , but effluent will be released horizontally, so assume no reduction for plume rise

Therefore effective stack height = Hs, H<sub>E</sub> = 25 feet

### Calculate Maximum Annual Impact (Ca)

$$\text{Ca } (\mu\text{g}/\text{m}^3) = 6 * Q_a / H_E^{2.25}$$

Q<sub>a</sub> = Emission Rate in pounds per year calculated above

Ca for PCE ( $\mu\text{g}/\text{m}^3$ ) =	0.97
Ca for TCE ( $\mu\text{g}/\text{m}^3$ ) =	0.0669
Ca for DCE ( $\mu\text{g}/\text{m}^3$ ) =	0.0819

### Calculate Maximum Potential Annual Impact (Cp)

$$\text{Cp } (\mu\text{g}/\text{m}^3) = 52,500 * Q / H_E^{2.25} \quad 1.66667$$

Q = Emission Rate in pounds per hour calculated above

Cp for PCE ( $\mu\text{g}/\text{m}^3$ ) =	0.97
Cp for TCE ( $\mu\text{g}/\text{m}^3$ ) =	0.0668

Hs/Hb = 1.67 > 1.5 , but effluent will be released horizontally, so assume no reduction for plume rise

AGC for PCE = 4.0 $\mu\text{g}/\text{m}^3$	Ca for PCE =	0.97	< 4	OK
AGC for TCE = 0.2 $\mu\text{g}/\text{m}^3$	Ca for TCE =	0.07	< 0.2	OK
AGC for DCE = 63.0 $\mu\text{g}/\text{m}^3$	Ca for DCE =	0.08	< 63	OK

### Calculate Maximum Short Term Impact (Cst)

Cst ( $\mu\text{g}/\text{m}^3$ ) = Cp \* 65

Cst for PCE ( $\mu\text{g}/\text{m}^3$ ) =	62.84
Cst for TCE ( $\mu\text{g}/\text{m}^3$ ) =	4.35

SGC for PCE = 300 $\mu\text{g}/\text{m}^3$	Cst for PCE =	62.84	< 300	OK
SGC for TCE = 20 $\mu\text{g}/\text{m}^3$	Cst for TCE =	4.35	< 20	OK

**There is no SGC for DCE.**

Since Ca for PCE and TCE are less than their respective AGC values,  
no vapor phase carbon units are necessary.

**Interim Remedial Measure Work Plan**  
***Morton Village Plaza Shopping Center***

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**APPENDIX D**

**Sub-Slab Depressurization System Component Specifications**



The Leader in Blower & Vacuum Solutions

# **Submittal Documentation**

**For:  
ROUX  
209 Shafter Street  
Islandia, NY 11749**

**Gasho Custom Package Utilizing AMETEK Blower Model  
EN757F72XL, Dilution Valve, Moisture Separator GX100  
Control Panel and Custom Sound Enclosure**

**Gasho, Inc.  
460 West Gay Street  
West Chester, PA 19380**

**JG18E-180615JLG.1**

**June 28, 2018**

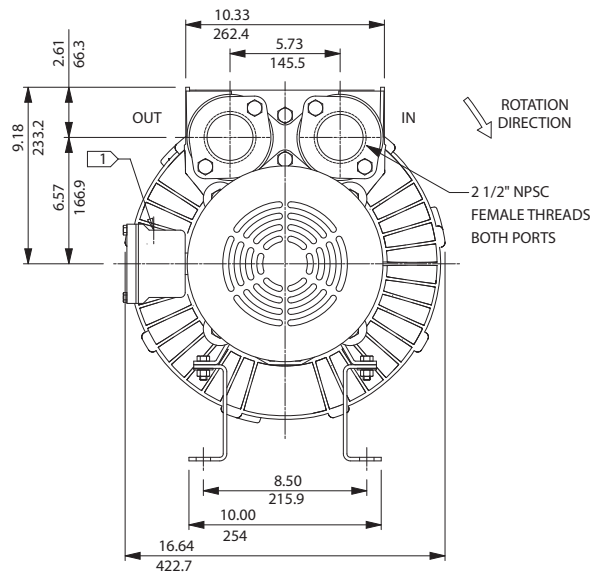
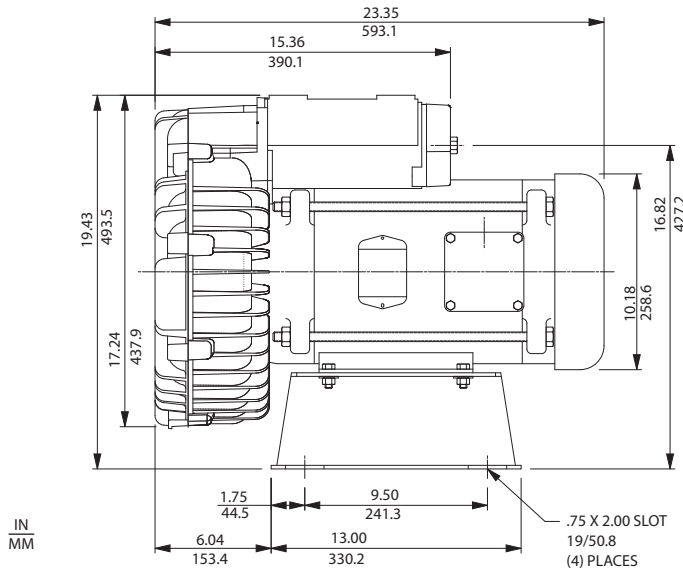
**Gasho, Inc.**  
JG18E  
REGEN BLOWER PACKAGE

				Description		Date	Revision
							A
Item	Qty.	Supplier	Description	Gasho P/N	Part Number	Misc ID	Weight
1	1	Ametek Rotron	Regenerative Blower	. BLW-EN757F72XL-0000	EN757F72XL	#08333 2 1/2"	158
2	1	Gasho	Base Weldment - Gasho Blue Enamel		1100-C-0754		200
2.1	1	Gasho	Control Box Support				39
3.1	1	McMaster	Camlock, 3"			3"FNPTX3" Male	3
4	1	Westwood	2." Dilution Valve	. FS-WS-2.0-P-0000	EMSP-2		8
4.1	1	Apollo	2." Ball Valve	. VBL-2.00-BT-0000			2
5	1	Fisher	1" Relief Valve	. RV-1.00-B-S-0000	289H-41		6
6	2	Gasho	Vacuum Gauges	. GV-2.5-0-060WC-0000	25.0.012.HG.160.IWC		
7	1	Gasho	Pressure Gauge	. GP-2.5-0-06PSI/160WC	25.0.006.PSI.160.IWC		
8	3	SMC Specialties	Isolation Valves	. VIS-0.25-FM-B-0000	VA BRS 025-4F4M-BT		
9	1	Gasho	Moisture Separator		GX-100		150
9.1	1	Gasho	MS Lid			3" FNPT half coupling	10
9.2	1	Jaeger	Tri-Paks			MS Media	9
9.3	1	Dwyer	Liquid level switch	. SW-L7-1.0-BSR-0100	L6-EPB-B-S-3-0		2
9.4	1	Oil Rite	Sight Gauge	. GS-12-0000	B1559-1-12		3
9.4.1	2	Oil Rite	Adapters	. ARC0.38X0.25-9000	ARCO.38X0.25-9000	B3565-22, ADP 3/8 MNPT	
9.5	1	Cooney	4" cap			Clean out	4
9.6	1	Apollo	1" ball valve	. VBL-1.00-BT-0000	77-105-01	Drain	3
10	1	McMaster	Guzzler Hand Pump	. MSP-10-1.00-0000	4332K17		4
11		ICP	Control Panel			230v/3ph	150
12		Dwyer	Low Vacuum Switch		1950-P		
			autodailer with Verizon				
		Gasho	Enclosure	42:Lx32"Wx39"H			751

81959	6/28/2018
81925	22-Jun
81967	6/28/2018
81962	6/28/2018
stock	stock
stock	stock
stock	stock
stock	stock
stock	stock
stock	stock
stock	stock
stock	stock
stock	stock
stock	stock
stock	stock
stock	stock
stock	stock
stock	stock
81804	released 6/28
81804	released 6/28



Sealed Regenerative Blower w/Explosion-proof Motor



## NOTES

1. TERMINAL BOX CONNECTOR HOLE 3/4" NPT FEMALE THREAD.
2. DRAWING NOT TO SCALE, CONTACT FACTORY FOR SCALE CAD DRAWING.
3. CONTACT FACTORY FOR BLOWER MODEL LENGTHS NOT SHOWN.

		Part/Model Number	
		EN757FL5MWL	CP757FX5MWLR
Specification	Units	081333	080616
Motor Enclosure - Shaft Mtl.	-	Explosion-proof-CS	CHEM XP-SS
Horsepower	-	5.5	5.5
Phase - Frequency	-	Single-60 hz	Single-60 hz
Voltage	AC	230	230
Motor Nameplate Amps	Amps (A)	21.7	21.7
Max. Blower Amps	Amps (A)	29.9	29.9
Locked Rotor Amps	Amps (A)	155	155
Service Factor	-	1	1
Starter Size	-	1.0	1.0
Thermal Protection	-	Class B - Pilot Duty	Class B - Pilot Duty
XP Motor Class - Group	-	I-D	I-D
Shipping Weight	Lbs	158	158
	Kg	71.7	71.7

**Voltage** - ROTRON motors are designed to handle a broad range of world voltages and power supply variations. Our dual voltage 3 phase motors are factory tested and certified to operate on both: **208-230/415-460 VAC-3 ph-60 Hz** and **190-208/380-415 VAC-3 ph-50 Hz**. Our dual voltage 1 phase motors are factory tested and certified to operate on both: **104-115/208-230 VAC-1 ph-60 Hz** and **100-110/200-220 VAC-1 ph-50 Hz**. All voltages above can handle a  $\pm 10\%$  voltage fluctuation. Special wound motors can be ordered for voltages outside our certified range.

**Operating Temperatures** - Maximum operating temperature: Motor winding temperature (winding rise plus ambient) should not exceed  $140^{\circ}\text{C}$  for Class F rated motors or  $120^{\circ}\text{C}$  for Class B rated motors. Blower outlet air temperature should not exceed  $140^{\circ}\text{C}$  (air temperature rise plus inlet temperature). Performance curve maximum pressure and suction points are based on a  $40^{\circ}\text{C}$  inlet and ambient temperature. Consult factory for inlet or ambient temperatures above  $40^{\circ}\text{C}$ .

**Maximum Blower Amps** - Corresponds to the performance point at which the motor or blower temperature rise with a  $40^{\circ}\text{C}$  inlet and/or ambient temperature reaches the maximum operating temperature.

**XP Motor Class - Group** - See Explosive Atmosphere Classification Chart in Section I

This document is for informational purposes only and should not be considered as a binding description of the products or their performance in all applications. The performance data on this page depicts typical performance under controlled laboratory conditions. AMETEK is not responsible for blowers driven beyond factory specified speed, temperature, pressure, flow or without proper alignment. Actual performance will vary depending on the operating environment and application. AMETEK products are not designed for and should not be used in medical life support applications. AMETEK reserves the right to revise its products without notification. The above characteristics represent standard products. For product designed to meet specific applications, contact AMETEK Technical & Industrial Products Sales department.

AMETEK DYNAMIC FLUID SOLUTIONS  
75 North Street, Saugerties, NY 12477  
USA: +1 215-256-6601 - Europe: +49 7703 930909 - Asia: +86 21 5763 1258  
Customer Service Fax: +1 215-256-1338  
www.ametekdfs.com

## EN 757 Single-Phase and CP Options

Sealed Regenerative Blower w/Explosion-proof Motor

## FEATURES

- Manufactured in the USA - ISO 9001 and NAFTA compliant
- Maximum flow: 310 SCFM
- Maximum pressure: 80 IWG
- Maximum vacuum: 75 IWG
- Standard motor: 5.0 HP, explosion-proof
- Cast aluminum blower housing, impeller, cover & manifold; cast iron flanges (threaded); teflon® lip seal
- UL & CSA approved motor with permanently sealed ball bearings for explosive gas atmospheres Class I Group D minimum
- Sealed blower assembly
- Quiet operation within OSHA standards

## MOTOR OPTIONS

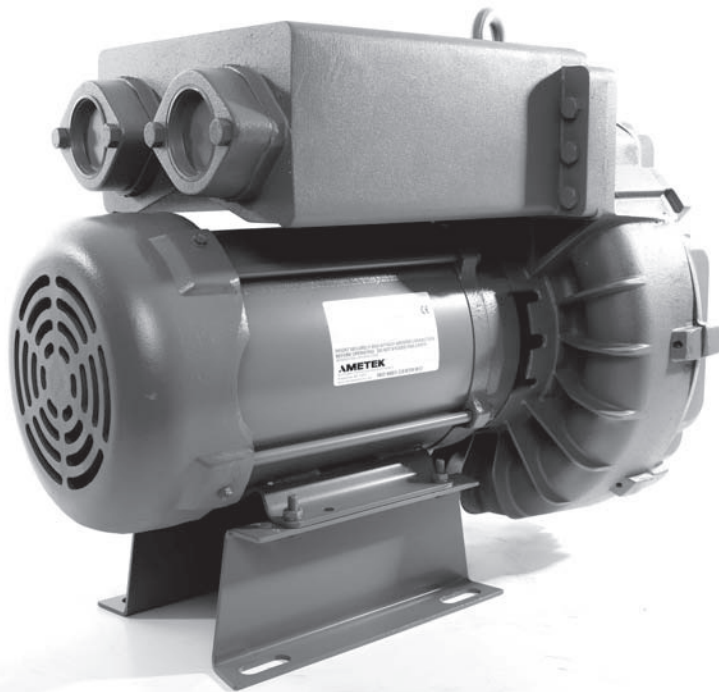
- International voltage & frequency (Hz)
- Chemical duty, high efficiency, inverter duty or industry-specific designs
- Various horsepower for application-specific needs

## BLOWER OPTIONS

- Corrosion resistant surface treatments & sealing options
- Remote drive (motorless) models
- Slip-on or face flanges for application-specific needs

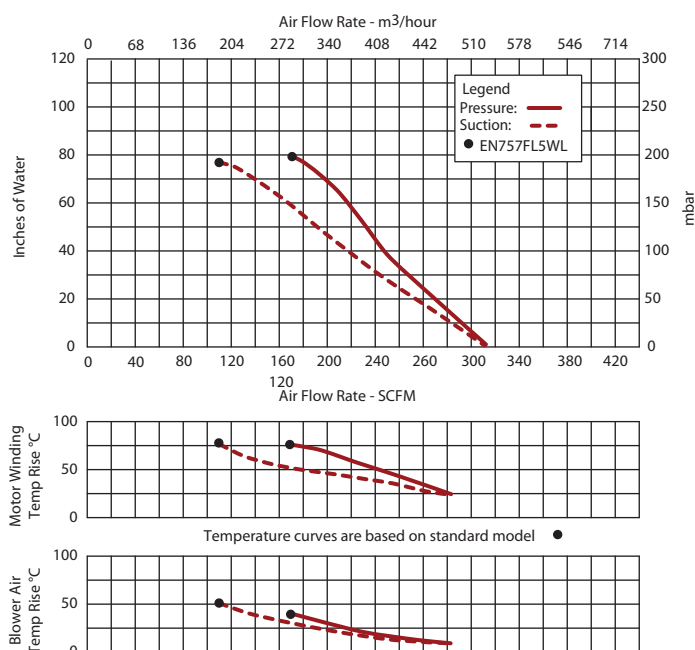
## ACCESSORIES

- Flowmeters reading in SCFM
- Filters & moisture separators
- Pressure gauges, vacuum gauges, & relief valves
- Switches - air flow, pressure, vacuum, or temperature
- External mufflers for additional silencing
- Air knives (used on blow-off applications)
- Variable frequency drive package

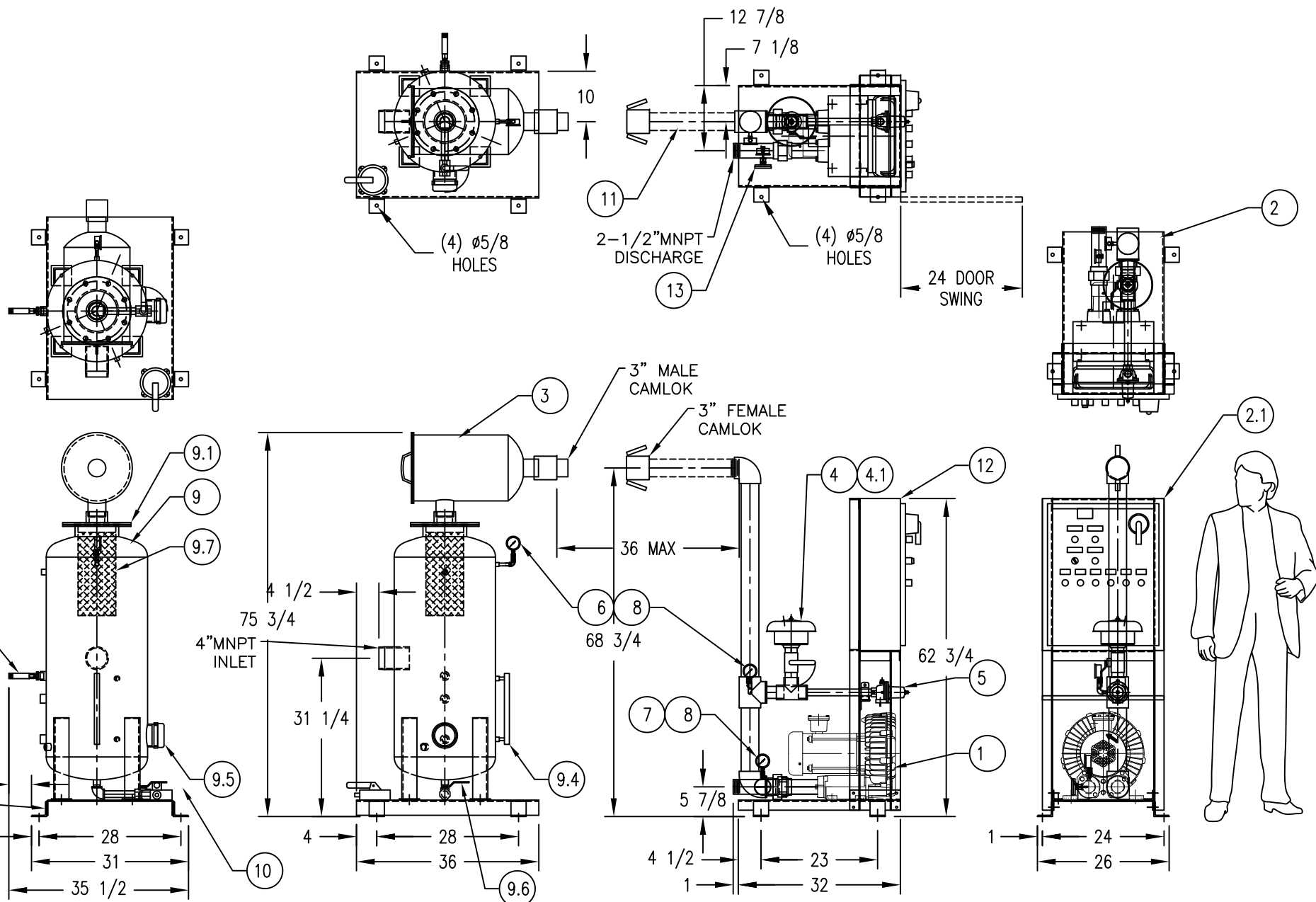


## Blower Performance at Standard Conditions

60 Hz

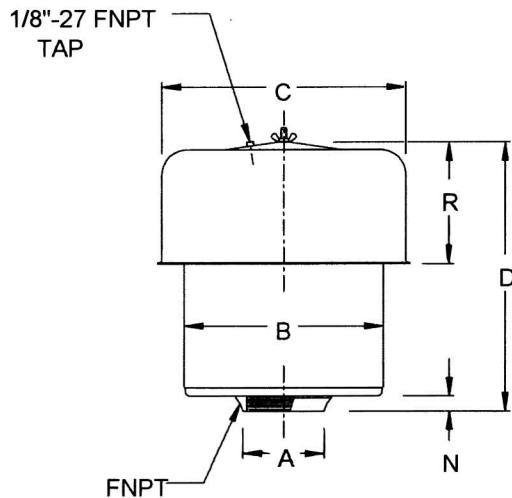


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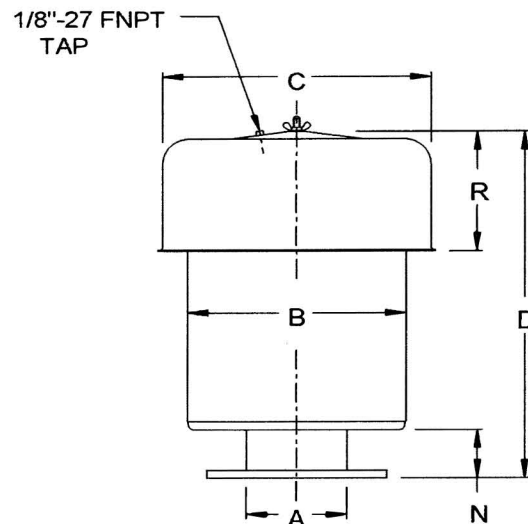


NOTES:  
 1. CUSTOMER PIPING TO BE INDEPENDENTLY SUPPORTED  
 2. TOLERANCE  $\pm 1/2"$   
 3. DIM ARE CRITICAL DIMENSIONS

			DRAWN BY: JJH	DATE 6/1/18	J.E.GASHO & Assoc., Inc. 460 W. GAY ST. WEST CHESTER, PENNSYLVANIA 19380
			APPROVED BY:	DATE	
			DIMENSIONS IN INCHES		
			SCALE NA	ENVIRONMENTAL BLOWER PACKAGE, EN757 5HP M. SEPARATOR, PANEL	
			TOLERANCE ±1/2"		ANGULAR TOLERANCE
			MATERIAL		WEIGHT 850
REV.	DATE	DESCRIPTION	SHEET 1 OF 1		JG18-E-3264   -



1" to 4" Female NPT Connection  
(4" flange connection available upon request)



5" and Larger-125/150# ANSI Drilled Plate Flange  
(5" FNPT connection available upon request)

									Element Model Number		
Model No.	A	C	B	D	N	R	Weight	CFM	Paper	Felt	Wire
EMS-1	1	9 1/2	6 5/8	5 3/8	9/16	2 1/4	8	35	P-642	F-642	W-642
EMS-125	1 1/4	9 1/2	6 5/8	5 3/8	9/16	2 1/4	8	35	P-642	F-642	W-642
EMS-15	1 1/2	9 1/2	6 5/8	5 3/8	9/16	2 1/4	8	75	P-642	F-642	W-642
EMS-2	2	9 1/2	6 5/8	5 7/16	5/8	2 1/4	8	120	P-642	F-642	W-642
EMS-25	2 1/2	14 7/8	12	11 7/8	13/16	4 7/16	20	200	P-974	F-974	W-974
EMS-3	3	14 7/8	12	13 5/8	13/16	4 7/16	20	275	P-974	F-974	W-974
EMS-35	3 1/2	14 7/8	12	13 5/8	13/16	6 7/16	25	375	P-976	F-976	W-976
EMS-4	4	14 7/8	12	13 5/8	1	6 7/16	25	500	P-976	F-976	W-976
EMS-5	5	14 7/8	12	25 1/2	3	7 3/8	36	750	P-1197	F-1197	W-1197
EMS-6	6	22	18	26 1/4	3	8 5/8	53	1100	P-13118	F-13118	W-13118
EMS-8	8	22	18	25	3	10 3/4	70	2200	P-171310	F-171310	W-171310
EMS-10	10	22	18	25	3	10 3/4	95	3000	P-171310	F-171310	W-171310
EMS-12	12	22	18	25	3	10 3/4	108	4300	P-171310	F-171310	W-171310
EMS-14	14	30	24	40	4	15 3/4	180	5900	P-231914	F-231914	W-231914
EMS-16	16	30	24	40	4	15 3/4	190	7700	P-231914	F-231914	W-231914

- When ordering specify paper (P); felt (F) or wire mesh (W) filter element.
  - 1 inch to 4 inch standard female NPT connection; 4 inch flange connection available upon request
  - 5 inch to 16 inch standard 125/150# ANSI drilled plate flange connection; 5 inch female NPT connection available upon request
- Dimensions in inches, weights in pounds. Dimensions and weights are nominal and may vary slightly with production models.  
Request certified drawings for exact dimensions.



The Leader in Blower & Vacuum Solutions

460 West Gay Street  
West Chester, PA 19380  
610-692-5650 Fax 610-692-5837  
cs@gasho.org

## Gasho Replacement Inlet Filter Elements

High quality replacement elements are available for the filters of various manufactures used on packages built by Gasho.

Paper elements are normally used in inlet filters and replaced when they are dirty.

Polyester elements are cleanable.

Filter Size, In.	Gasho Filter #	Box Quantity	O.D.	I.D.	Ht.	List Price
1	GA-0470	6	5-13/16	4	2	\$17.00
2	GA-0471	6	5-13/16	4	2-1/2	\$17.00
2.5-3	GA-0472	2	9-3/4	7-1/4	4	\$23.00
4	GA-1063	2	9-3/4	7-1/4	6	\$27.00
5	GA-0474	1	11-1/2	9-7/8	7	\$35.00
6	GA-0475	1	13-5/8	11-5/8	8-5/8	\$53.00
8-12	GA-1163	1	17	13	10	\$185.00

GA-0471 Elements are frequently used to replace GA -0470

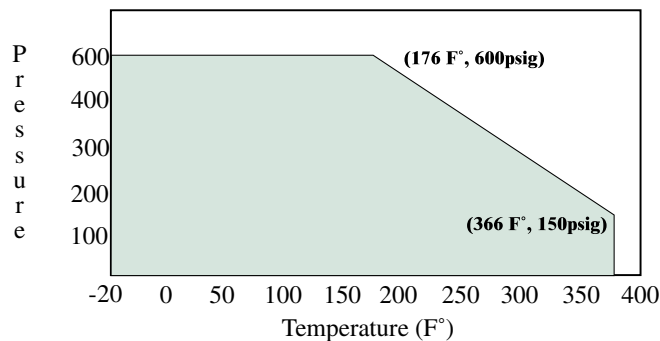
## Manufacturer Cross Reference

Gasho Filter #	Universal Filter #	EM Prod. Filter #	Full-On Filters #	Solberg #
GA-0470	81-0470		FOF810470	32-00
GA-0471	81-0471	P-642	FOF810471	32-02
GA-0472	81-0472	P-974	FOF810472	32-04
GA-1063	81-1063	P-976	FOF811063	32-06
GA-0474	81-0474	P-1197	FOF810474	32-08
GA-0475	81-0475	P-13118	FOF810475	32-10
GA-1163	81-1163	P-171310	FOF811163	32-12

# Standards Compliance

IPG's 64 series brass ball valves comply with the latest editions of these published standards:

- AGA Z21.15.CGA9.1
- AGA No. 3-88
- ANSI B1.20.1
- ANSI B16.18
- CAN/CGA-3.16-M88
- ASME/ANSI B16.33
- ASME/ANSI B16.38
- MSS SP-110
- UL Guide YSDT
- UL Guide YRPV
- UL Guide VQGU



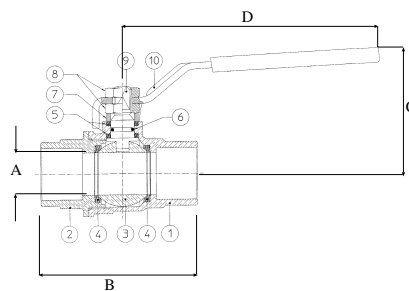
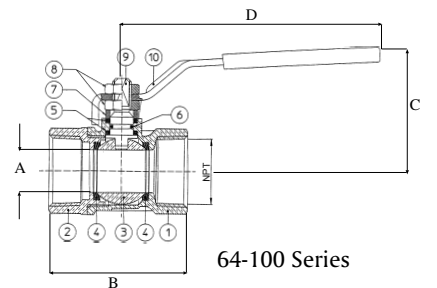
## Materials of Construction

Description	Materials
1. Body	Brass UNI 5705-65
2. Retainer	Brass UNI 5705-65
3. Ball	Brass UNI 5705-65
4. Seats	PTFE
5. Stem Seals	PTFE
6. O-Ring	NBR 75 Shore A
7. Packing Gland	Brass UNI 5705-65
8. Nut	Plated Steel
9. Stem	Brass UNI 5705-65 Cr Plated
10. Lever Handle	Plated Steel 1/4" - 2" Models Aluminum 2 1/2" - 4" Models

## Optional Kits

Valve Size	Locking Handle	Stem Extensions	Balancing Stops
1/4", 3/8" & 1/2"	78-1659-01	78-1501-0	78-1506-01
3/4" & 1"	78-1660-01	78-1502-0	78-1507-01
1-1/4" & 1-1/2"	78-1661-01	78-1503-0	78-1508-01
2"	78-1662-01	78-1504-0	78-1509-01
2-1/2" & 3"	-	78-1505-0	78-1510-01

NOTE: Specify (-07) suffix for T-Handle i.e. 64-105-07.



## 64-100 Dimensional Data

Size	Part No.	A	B	C	D	(Cv)
1/4" NPT	64-101-01	0.39	2.02	1.75	3.85	6
3/8" NPT	64-102-01	0.39	2.02	1.75	3.85	7
1/2" NPT	64-103-01	0.59	2.44	1.88	3.85	19
3/4" NPT	64-104-01	0.78	2.71	2.28	4.80	34
1" NPT	64-105-01	0.98	3.07	2.44	4.80	50
1-1/4" NPT	64-106-01	1.25	3.42	3.07	6.02	104
1-1/2" NPT	64-107-01	1.57	3.89	3.34	6.02	268
2" NPT	64-108-01	1.96	4.33	3.79	6.37	309
2-1/2" NPT	64-109-01	2.56	5.59	5.02	8.07	629
3" NPT	64-100-01	3.15	6.45	5.45	8.07	1018
4" NPT	64-10A-01	3.94	7.60	6.34	10.23	1622

## 64-200 Dimensional Data

Size	Part No.	A	B	C	D	(Cv)
1/2"	64-203-01	0.59	2.53	1.88	3.85	19
3/4"	64-204-01	0.78	2.99	2.28	4.80	34
1"	64-205-01	0.98	3.58	2.44	4.80	50
1-1/4"	64-206-01	1.25	4.09	3.07	6.02	104
1-1/2"	64-207-01	1.57	4.56	3.34	6.02	268
2"	64-208-01	1.96	5.43	3.79	6.37	309
2-1/2"	64-209-01	2.56	6.93	5.02	8.07	629
3"	64-200-01	3.15	8.09	5.45	8.07	1018

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## 289 Series Spring-Loaded Relief Valves

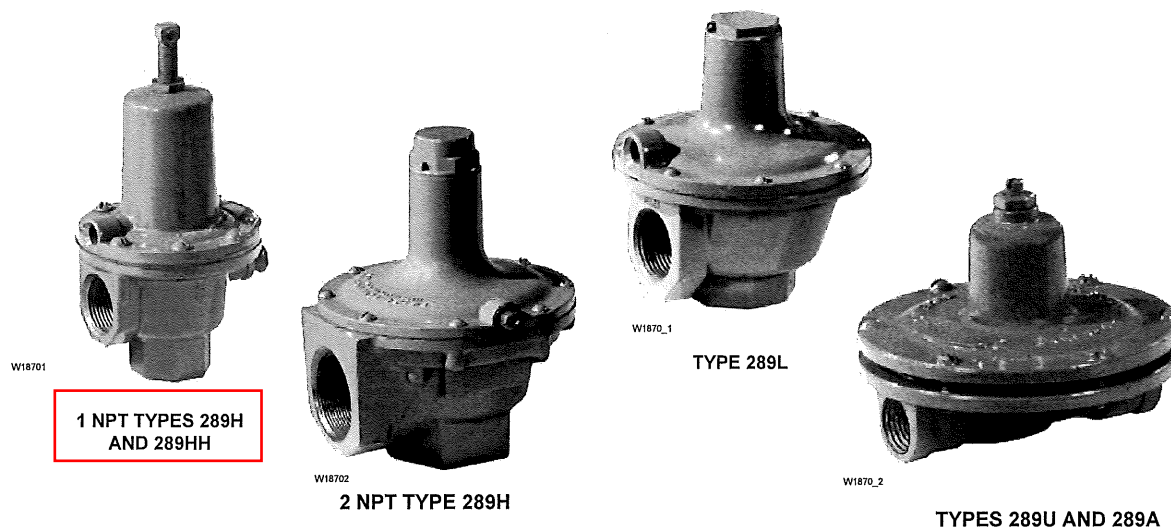


Figure 1. Types 289H, 289L, and 289U Relief Valves

### Introduction

The 289 Series relief valve is a throttling relief valve used downstream of pressure regulators to protect the downstream system from overpressure. A smooth throttling action minimizes pressure surges in the system during emergency operation. These relief valves are available in 1/4, 3/4, 1, or 2 NPT sizes with spring ranges (relief pressure settings) from 5-inches w.c. to 75 psig / 12 mbar to 5.2 bar.

All sizes above 1/4 NPT feature a pitot tube booster (Figure 1) for achieving the highest possible relief capacity with a minimum buildup of system pressure. When the valve is opening, high gas velocity through the orifice creates an area of relatively low pressure near the end of the pitot tube. This pitot tube effect forms a partial vacuum above the diaphragm which helps to open the valve.

The relief valve diaphragm functions as a valve disk to control flow in all types except the Types 289H and 289HH, which use O-ring seats. The Nitrile (NBR) or Neoprene (CR) seating surfaces provide tight

shutoff. The 289 Series relief valves are ideal for low-pressure settings due to the increased sensitivity provided by the large diaphragm area.

### Features

- **Throttling Type Relief**—Smooth, sensitive throttling action minimizes pressure surges.
- **High Flow Rates**—As shown by the Figure 3 capacity curves, high flow rates can be achieved with minimum pressure buildup due to the boosting system which increases the relief valve opening.
- **Small Size**—The 289 Series relief valves are small and compact, making them suitable for areas limited in space.
- **Reliability Due to Simplicity**—A single internal assembly decreases the possibility of mechanical failure.

## Specifications

### Available Configurations

**Type 289A:** 1/4 NPT spring-loaded relief valve for relief pressure settings of 3 to 22 psig / 0.21 to 1.5 bar, two spring ranges

**Type 289H:** 1 or 2 NPT spring-loaded relief valve for relief pressure settings of 1 to 50 psig / 0.07 to 3.4 bar four spring ranges, in the 1 NPT and of 7-inches w.c. to 10 psig / 17 mbar to 0.69 bar, four spring ranges, in the 2 NPT

**Type 289HH:** 1 NPT spring-loaded relief valve for relief pressure settings of 45 to 75 psig / 3.1 to 5.2 bar

**Type 289L:** 3/4 or 1 NPT spring-loaded relief valve for relief pressure settings of 10 to 40-inches w.c. / 25 to 99 mbar, two spring ranges

**Type 289U:** 1/4 NPT spring-loaded relief valve for relief pressure settings of 5-inches w.c. to 3 psig / 12 mbar to 0.21 bar, two spring ranges

### Inlet Connections

**Type 289L:** 3/4 or 1 NPT

**Types 289A and 289U:** 1/4 NPT

**Type 289H:** 1 or 2 NPT

**Type 289HH:** 1 NPT

### Outlet (Vent) Connections

Same size as inlet connection

### Maximum Allowable Relief (Inlet) Pressure<sup>(1)</sup> and Maximum Relief Set Pressure

See Table 1

### Capacity Data

See Figure 3

### Standard Construction Materials

#### Valve Body and Spring Case

*Types 289A and 289U:* Zinc

*Types 289H (1 NPT), 289HH, and 289L:* Aluminum

*Type 289H (2 NPT):* Cast iron body with Aluminum spring case

#### Diaphragm

*Type 289A:* Neoprene (CR)

*Types 289H and 289HH:* Nitrile (NBR) or Fluorocarbon (FKM)

*Types 289L and 289U:* Nitrile (NBR)

### Standard Construction Materials (continued)

#### Orifice

*Types 289A and 289L:* Aluminum

*Type 289H (2 NPT Only):* Brass or Stainless steel

#### O-Ring Seat (Types 289H and 289HH Only):

Nitrile (NBR) or Fluorocarbon (FKM)<sup>(2)</sup>

#### O-Ring Seat Holder and Washer

#### (1 NPT Types 289H and 289HH Only):

Aluminum

#### Seat Washer (2 NPT Type 289H Only):

Stainless steel

#### Pitot Tube

*Types 289H, 289HH (1 NPT), and 289L:*

Aluminum  
*Type 289H (2 NPT):* Brass or Stainless steel

#### Gaskets

*Type 289L:* Neoprene (CR)

*All Others:* Composition

#### Spring: Zinc-plated steel

#### Diaphragm Plate

*Types 289A and 289U:* Zinc

*All Others:* Zinc-plated steel

#### Closing Cap

*Type 289L:* Plastic, Aluminum, or Zinc

*Type 289H (2 NPT):* Zinc

### Temperature Capabilities<sup>(1)</sup>

#### With Nitrile (NBR) and Neoprene (CR) Elastomer:

-20° to 150°F / -29° to 66°C

#### With Fluorocarbon (FKM):

20° to 300°F / -7° to 149°C

Available with Types 289H and 289HH only

### Approximate Weights

**Types 289A and 289U:** 0.75 pounds / 0.3 kg

#### Type 289H

*1 NPT:* 4 pounds / 2 kg

*2 NPT:* 15 pounds / 7 kg

**Type 289HH:** 4 pounds / 2 kg

**Type 289L:** 15 pounds / 7 kg

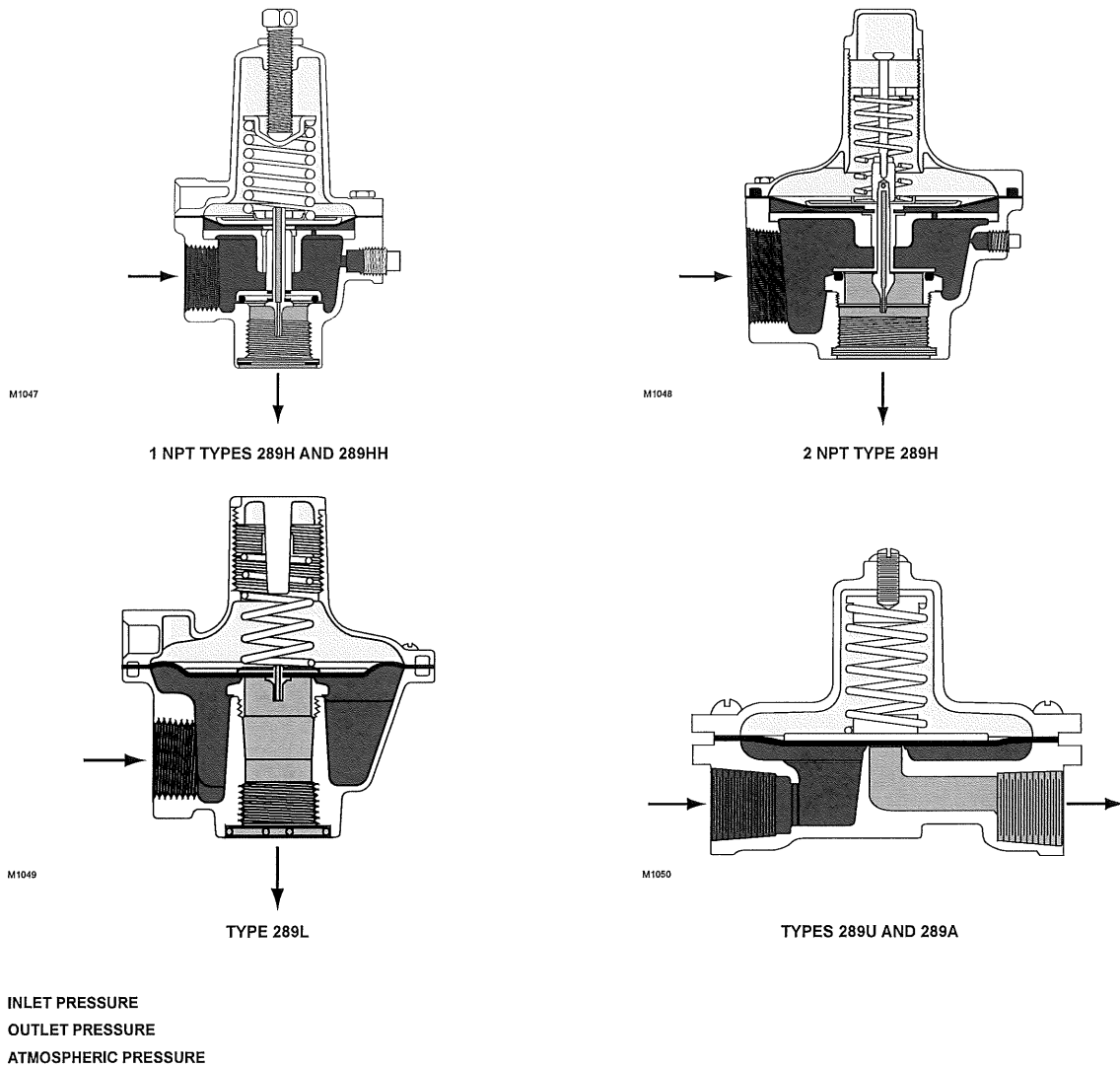
### Options

- Polytetrafluoroethylene (PTFE) diaphragm protector (Types 289A and 289U only)
- Wire-seal on closing cap (1 NPT Type 289L only)

1. The pressure/temperature limits in this Bulletin and any applicable standard limitation should not be exceeded.

2. Bubble-tight shutoff cannot be attained at settings below 5 psig / 0.35 bar with Fluorocarbon (FKM) O-ring seat.



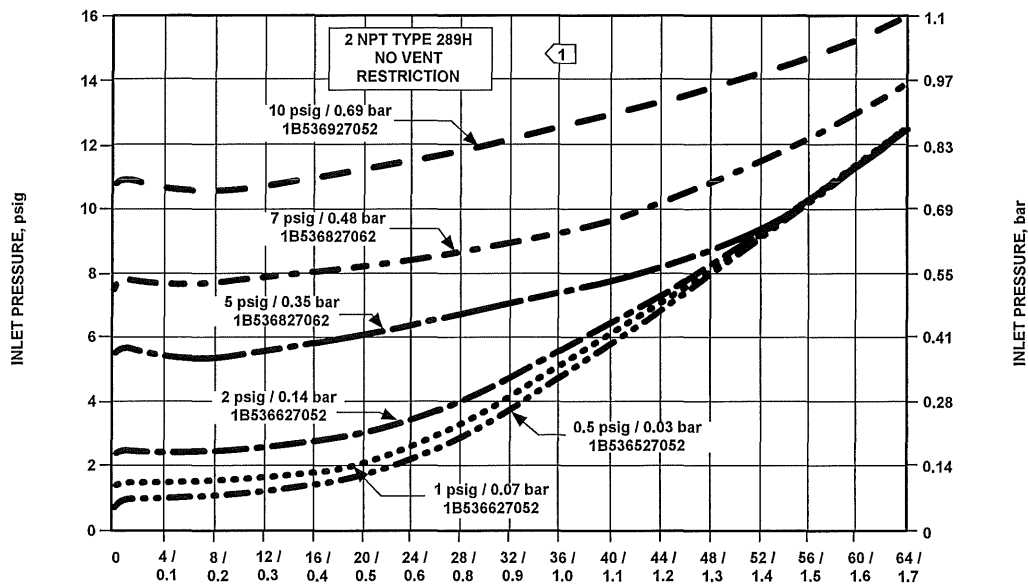
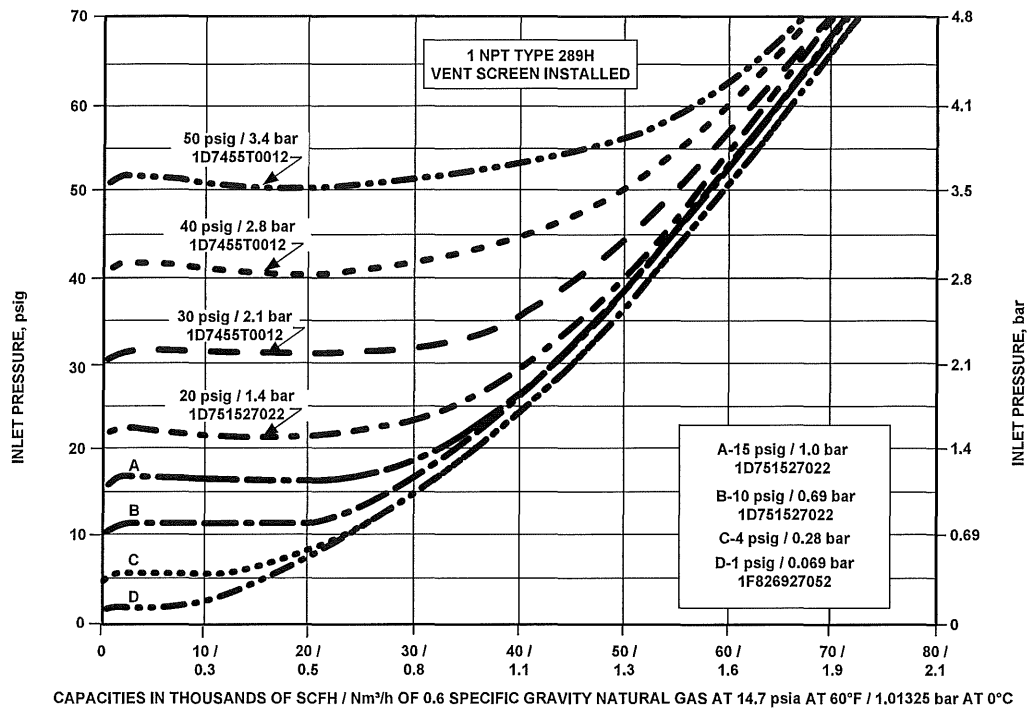


**Figure 2.** Types 289H, 289L, and 289U Operational Schematics

**Table 1.** Maximum Allowable Relief (Inlet) Pressure

AVAILABLE CONFIGURATION	BODY SIZE, NPT	SPRING PART NUMBER	COLOR CODE	SPRING RANGE (RELIEF PRESSURE SETTINGS)		MAXIMUM ALLOWABLE RELIEF (INLET) PRESSURE <sup>(1)</sup>	
Type 289A	1/4	0Z056327022 1B268227022	Silver Silver	3 to 13 psig 11 to 22 psig	0.21 to 0.90 bar 0.76 to 1.5 bar	45 psig	3.1 bar
Type 289H	1	1F826927052 1D892327022 1D751527022 1D7455T0012	Pink Red Silver Green	1 to 4.5 psig 4 to 15 psig 10 to 20 psig 15 to 50 psig	0.07 to 0.31 bar 0.28 to 1.0 bar 0.69 to 1.4 bar 1.0 to 3.5 bar	100 psig	6.9 bar
	2	1B536527052 1B536627052 1B536827062 1B536927052	Dark Blue Gray Dark Green Red Stripe	7 to 18-inches w.c. 0.5 to 2.25 psig 1.75 to 7 psig 4 to 10 psig	17 to 45 mbar 0.03 to 0.16 bar 0.12 to 0.48 bar 0.28 to 0.69 bar	25 psig	1.7 bar
Type 289HH	1	1D7455T0012	Green	45 to 75 psig	3.1 to 5.2 bar	100 psig	6.9 bar
Type 289L	3/4 or 1	13A7917X012 13A7916X012	Silver Red Stripe	10 to 18-inches w.c. 12 to 40-inches w.c.	25 to 45 mbar 30 to 99 mbar	7 psig	0.48 bar
Type 289U	1/4	0V060227022 0F058227022	Silver Silver	5 to 25-inches w.c. 20-inches w.c. to 3 psig	12 to 62 mbar 50 to 207 mbar	10 psig	0.69 bar

1. This value indicates the relief pressure setting plus pressure build-up.



**NOTE:**

1. LESS THAN A 5% CAPACITY LOSS CAN BE EXPECTED WITH THE VENT SCREEN INSTALLED ON THE 2 NPT TYPE 289H AT MAXIMUM FLOW.
2. WHEN SELECTING ANY RELIEF VALVE FOR INSTALLATION DOWNSTREAM OF THE REGULATOR, THE CAPACITY OF THE RELIEF VALVE SHOULD BE COMPARED WITH THE WIDE-OPEN CAPACITY OF THE REGULATOR.
3. BUBBLE POINT RELIEF SETTING AND SPRING PART NUMBER ARE NOTED ON EACH CURVE.
4. TO CONVERT TO EQUIVALENT CAPACITIES OF OTHER GASES, MULTIPLY VALUES OBTAINED FROM CURVE BY THE FOLLOWING FACTORS: AIR-0.78, PROPANE-0.628, BUTANE-0.548, NITROGEN-0.789.

**Figure 3. Capacity Curves**

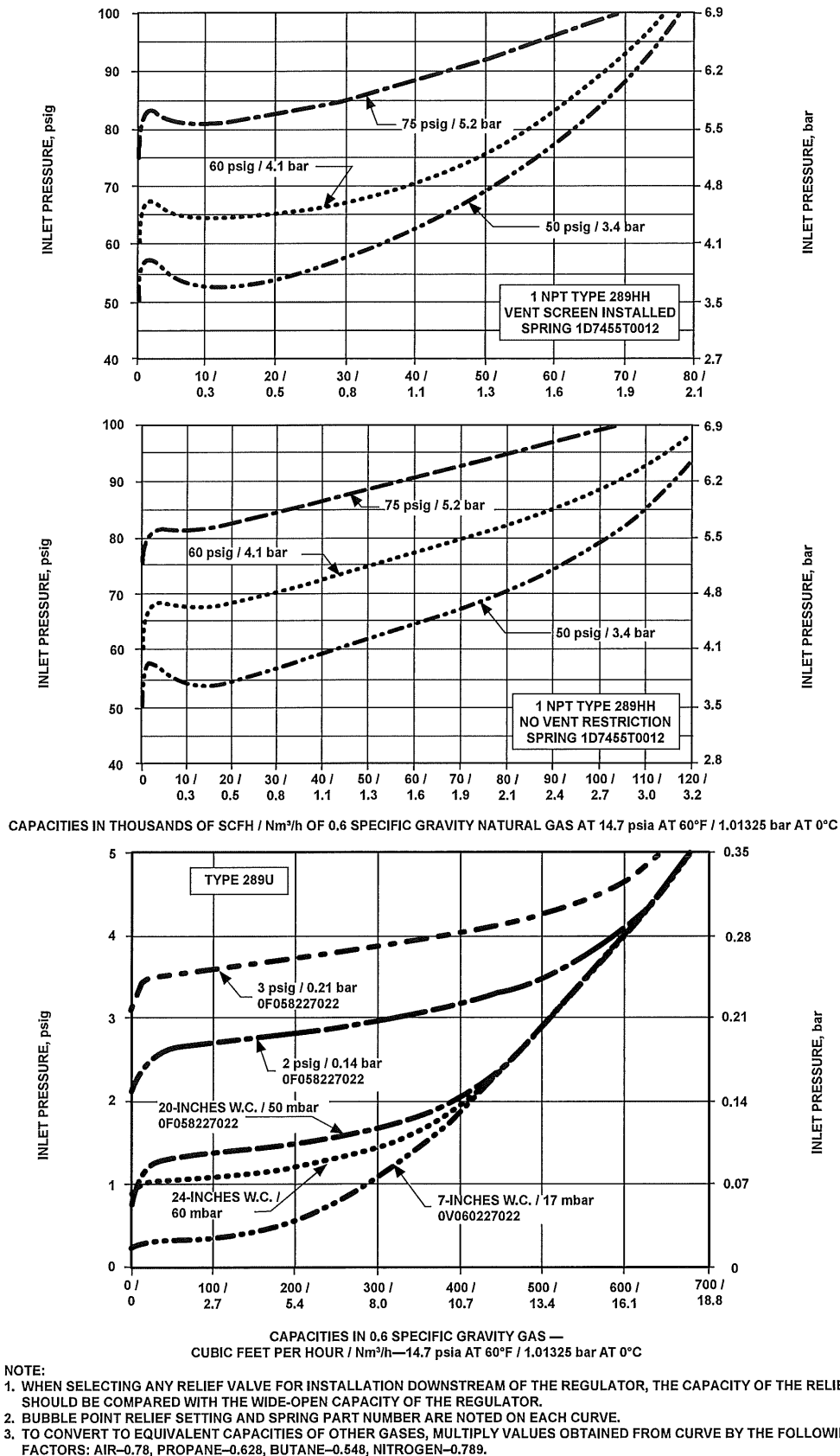
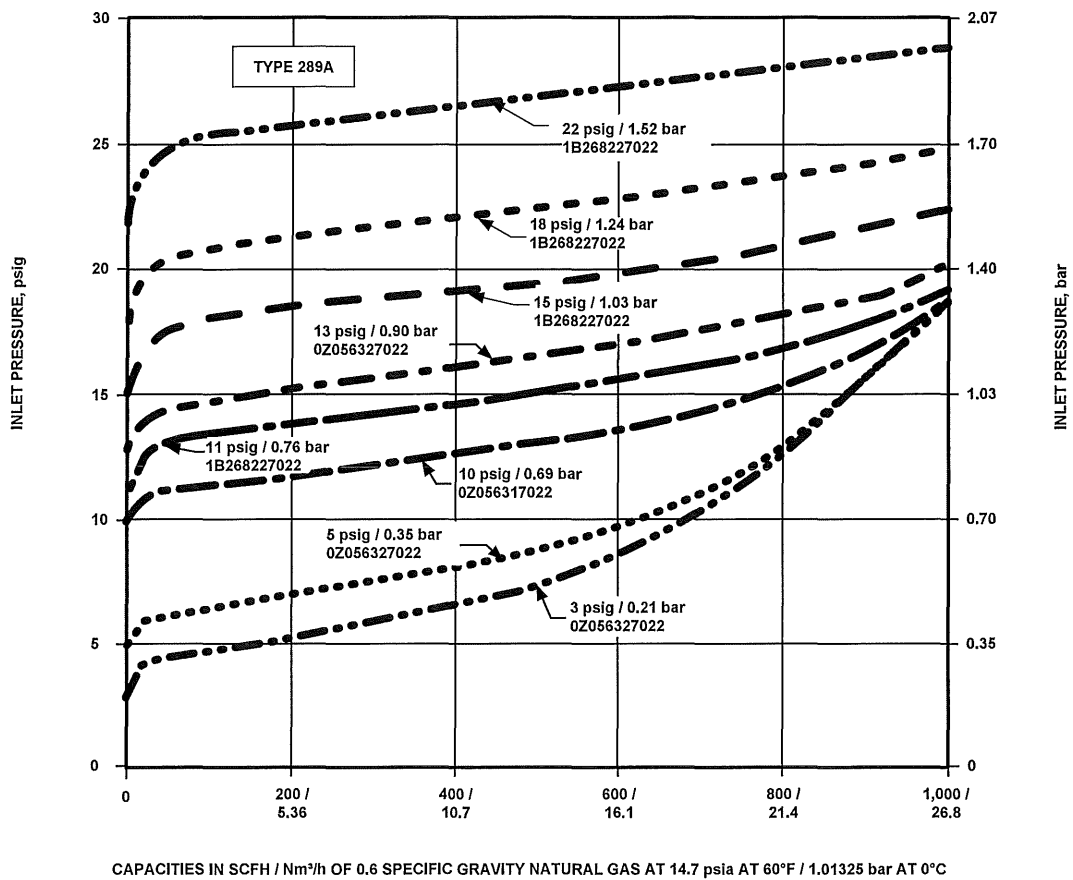
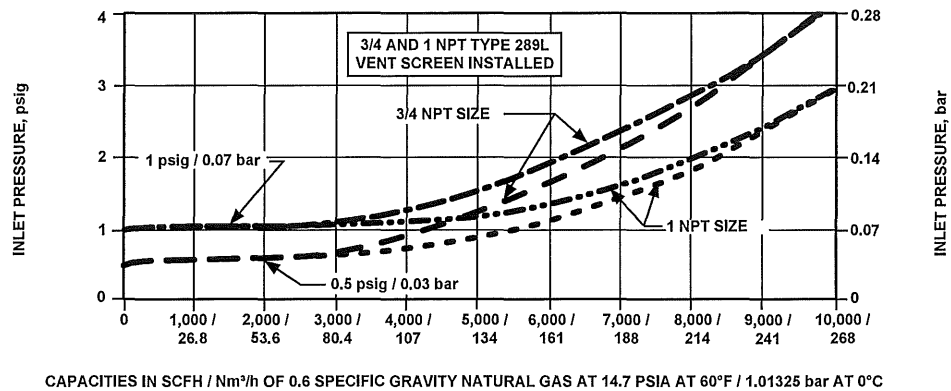


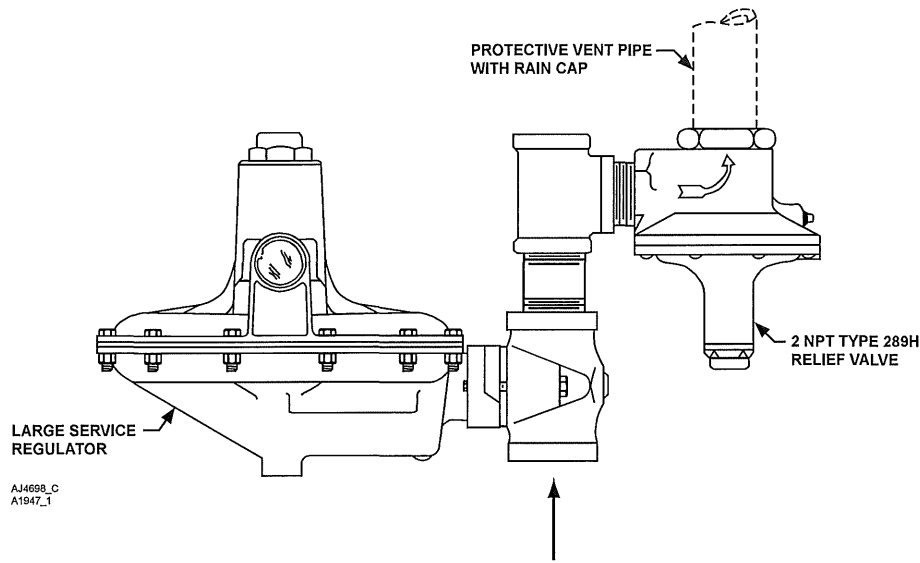
Figure 3. Capacity Curves (continued)



**NOTE:**

1. WHEN SELECTING ANY RELIEF VALVE FOR INSTALLATION DOWNSTREAM OF THE REGULATOR, THE CAPACITY OF THE RELIEF VALVE SHOULD BE COMPARED WITH THE WIDE-OPEN CAPACITY OF THE REGULATOR.
2. BUBBLE POINT RELIEF SETTING IS NOTED ON EACH CURVE.
3. TO CONVERT TO EQUIVALENT CAPACITIES OF OTHER GASES, MULTIPLY VALUES OBTAINED FROM CURVE BY THE FOLLOWING FACTORS: AIR-0.78, PROPANE-0.628, BUTANE-0.548, NITROGEN-0.789.

Figure 3. Capacity Curves (continued)



**Figure 4.** Typical Installation of a 289 Series Relief Valve

## Installation

The 289 Series relief valves may be installed in any position. However, the outlet connection must be protected against the entrance of rain, snow, insects, or any other foreign material that may plug the outlet or affect the opening and closing of the valve (see Figure 4). If it is necessary to pipe away the outlet, remove the outlet screen (if one is present).

Flow through the valve must be as indicated by the flow direction arrow on the body (inlet connection is marked on some sizes).

The spring case vent on the 2 NPT Type 289H is tapped and plugged. This vent opening must remain plugged to allow the pitot tube booster to function.

## Overpressure

Overpressure conditions in a regulating system may cause personal injury or equipment damage due to bursting of pressure-containing parts or explosion of accumulated gas. Check the system for damage if any of the maximum allowable relief (inlet) pressure ratings in Table 1 are exceeded.

## Ordering Information

When ordering, specify:

1. Type number and size
2. Relief pressure range and setting desired
3. Type of gas (natural gas, air, etc.); list any factors such as impurities in the gas that may affect compatibility of the gas with valve trim parts
4. Temperature and specific gravity of the gas
5. Maximum relief (inlet) pressure and flow rate desired
6. Line size and end connection size of adjacent piping
7. For Types 289H and 289HH, specify material of diaphragm and O-ring seat; for 2 NPT Type 289H, specify material of orifice and pitot tube
8. Options desired, if any



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*Authorized Manufacturer's Representative*

*Air / Gas Moving Equipment*

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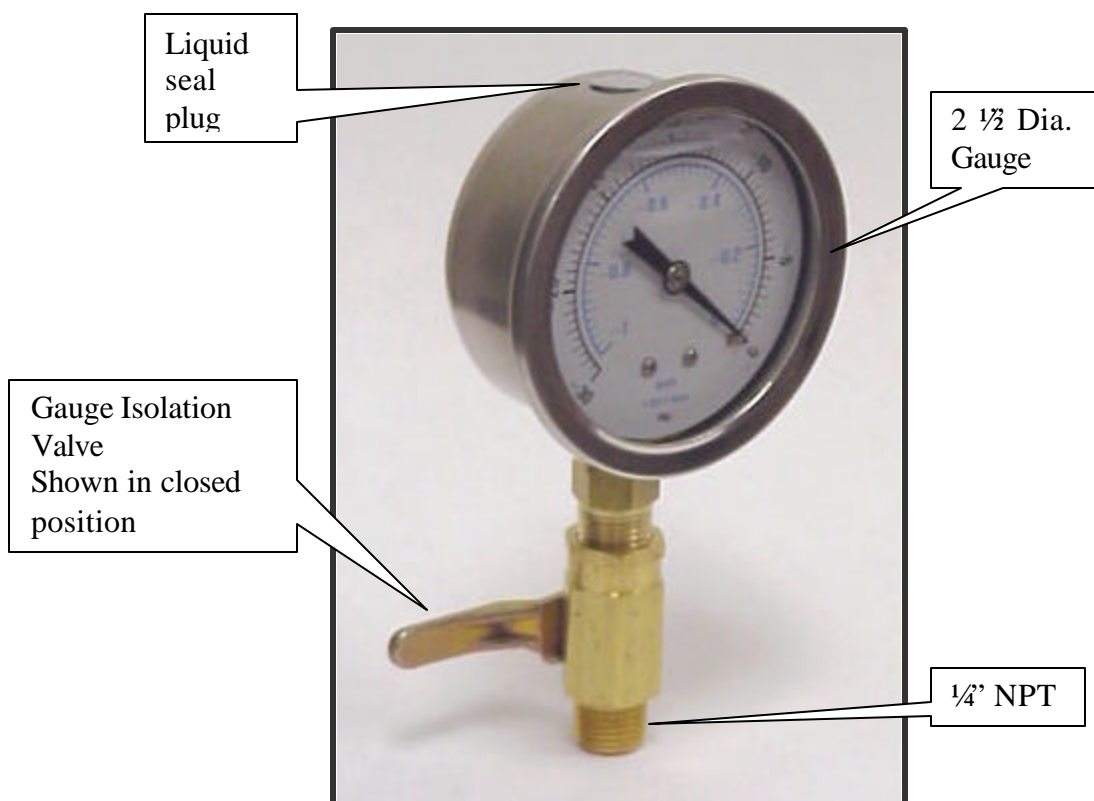
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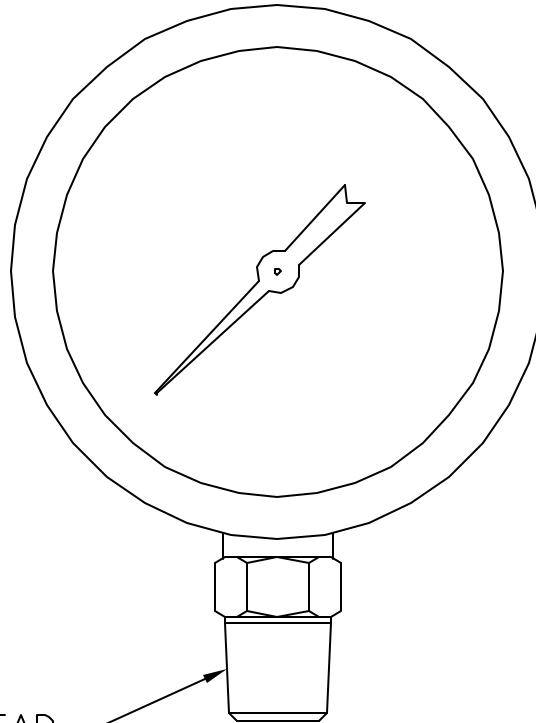
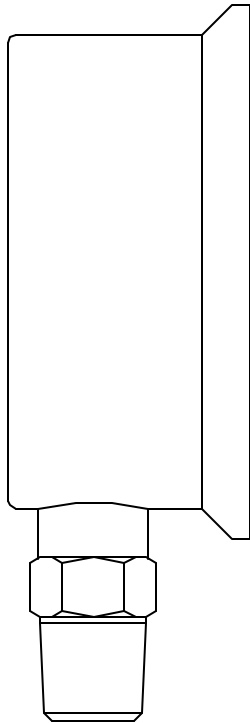
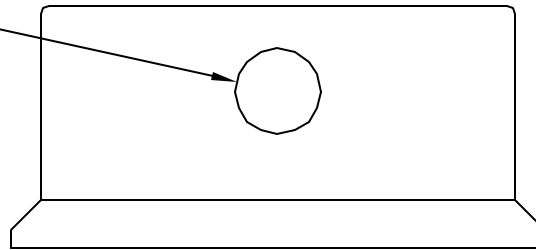
## Pressure and Vacuum Gauges

We use both standard gauges and liquid filled gauges from a variety of manufacturers. Gauges are installed on our packages with gauge isolation valves (gauge cocks) part number BRS-VA-025-4F4M-BT. The gauge isolation valve can be used as a snubber while reading the gauge by opening it slightly. To protect gauges from damage due to shocks or pulsations in the system, gauge isolation valves should be closed except when the gauge is being read.

Liquid filled gauges may display incorrect readings due to variations in atmospheric pressure. To determine if a gauge is subject to this condition, the liquid filled cavity should be temporarily vented to atmosphere. Most liquid filled gauges have a seal plug in the liquid filled cavity. Remove this plug to allow the cavity to be vented to atmosphere. In some instances the case can be lightly squeezed to burp it. Replace the plug.



VENT PLUG  
LIQUID FILLED ONLY



1/4" NPT THREAD

NOMINAL SIZE

> 25 = 2.5in  
40 = 4.0 in.

TYPE

> 0 = NON-FILLED  
1 = LIQUID FILLED

RANGE

25.0.015PSI

NOTES:

1. WE USE BOTH STANDARD GAUGES &  
LIQUID FILLED GAUGES FROM A  
VARIETY OF MANUFACTURERS

2. STANDARD RANGES:

PRESSURE: 0-6 PSI & 0-160 IWC

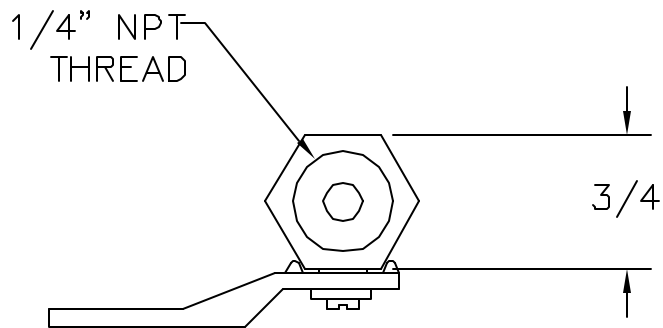
0-15 PSI

0-30 PSI

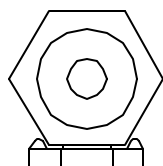
VACUUM: 0-12 IN. HG. & 0-160 IWC

0-30 IN., HG.

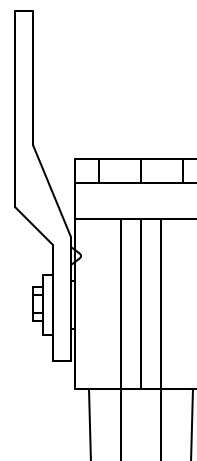
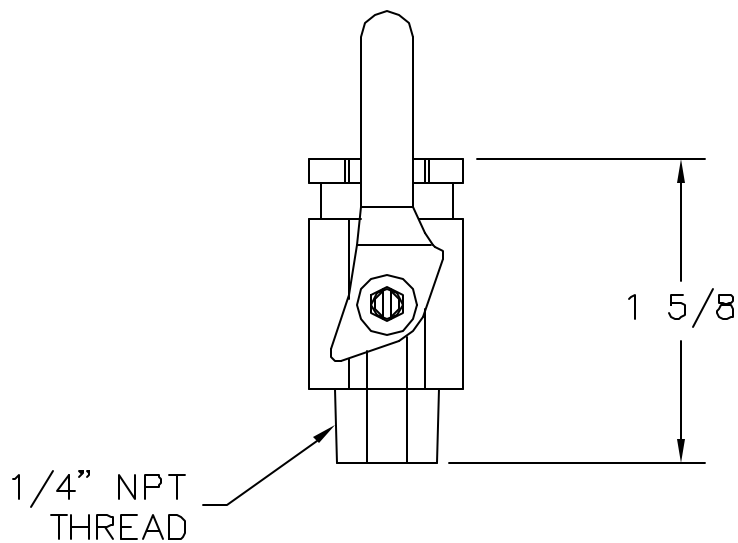
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			M. WITTE	8-18-00	
			APPROVED BY:	DATE	PRESSURE GAUGE NUMBERING SYSTEM
			DIMENSIONS IN INCHES		
			SCALE		
			TOLERANCE	ANGULAR TOLERANCE	
			MATERIAL	WEIGHT	
REV.	DATE	DESCRIPTION	SHEET 1 OF 1		—



PLAN VIEW – CLOSED



PLAN VIEW – OPEN



			DRAWN BY: M. WITTE	DATE 8-17-00	J. E. GASHO & Assoc., Inc. 460 W. GAY ST. WEST CHESTER, PENNSYLVANIA 19380	
			APPROVED BY:	DATE		
			DIMENSIONS IN INCHES		GAUGE ISOLATION VALVE SMC VA BRS 025-4F4M-BT	
			SCALE			
			TOLERANCE	ANGULAR TOLERANCE		
			MATERIAL	WEIGHT		
REV.	DATE	DESCRIPTION	SHEET 1 OF 1			—





Maximum Operating Pressure - 500 psi  
 Maximum Operating Temperature - 180 Degrees F  
 Ball Through Hole Diameter - .218

## 025 SERIES BALL VALVE

### 025 One-Way Ball Valve Design Considerations

The 025 Series One-Way Ball Valve compact design promotes multiple configurations to fit the exact end use application. The 025 Ball Valve Series is rated to 500 psi and will support flow and pressure only in the flow direction. The 025 Series has a one-piece body construction, stamped with directional flow arrows, to cover 1/4" NPT end configuration applications. The Zinc Die Cast Lever Handle is standard. Handles can be ordered Reversed - to lie over the outlet when the valve is in the open position. UL configurations are available and rated to 250 psi. UR configurations are available and rated to 500 psi.

<b>Example:</b>	<u>Inlet End</u>	<u>Outlet End</u>	<u>Seal</u>	<u>Handle</u>	<u>Plating</u>
	1/4 FNPT	1/4 MNPT	Buna-N	Steel	ENP
<b>SMC Part Number:</b> 025-4F4M-B,SH,ENP					

The handle will lie over the Inlet port when the valve is in the open position. SMC Part Numbers are a description of the valve as read left to right, Inlet to Outlet.

**Example:** 025-4F4M-B,SH,ENP = 1/4 FNPT Inlet x 1/4 MNPT Outlet

### 025 Series Options

**Material Options** Brass Body, Nickel Plated Brass Ball, Teflon® Seats, Stainless Handle Screw

**Seal Options** Buna-N, Ethylene Propylene, Fluoroelastomer (Viton®), Neoprene

<b>Body Options</b>	1/4 Female x 1/4 Female NPT	1/4 Female x 11/16-16 Male
	1/4 Female x 1/4 Male NPT	1/4 Female x 7/16-24 Female
	1/4 Female x 1/8 Female NPT	1/4 Female x 1/4 Female Flare
	1/4 Female x 1/8 Male NPT	1/4 Female x 3/8 Compression
	1/4 Female x 1/4 Hose Barb	

**Handle Options** Zinc Die Cast Lever (Standard), Zinc Die Cast Lever with Red Vinyl Sleeve, Steel Lever, Steel Lever, Round Handle, Steel Lever, Steel Lever with Red Vinyl Sleeve, Round Zinc Die Cast Handle, Black Nylon T-Handle, Blue Nylon Knob, .312 x 1" Stem, Screw Slot Headed Ball

**Plating Options** Electroless Nickel, Black Zinc

**SMC will quote alternate materials or customize our standard products when quantities ensure competitive pricing.**  
**Contact Customer Service at (651) 653-0599, FAX - (651) 653-0989, E-Mail - [info@specialtymfg.com](mailto:info@specialtymfg.com)**



The Leader in Blower & Vacuum Solutions

460 West Gay Street  
West Chester, PA 19380

## GX100-DL Moisture Separator Specification

100 gallon vessel with approx. 40 gallons of storage

Reinforced for high vacuum

Flow Rate- 400 ICFM

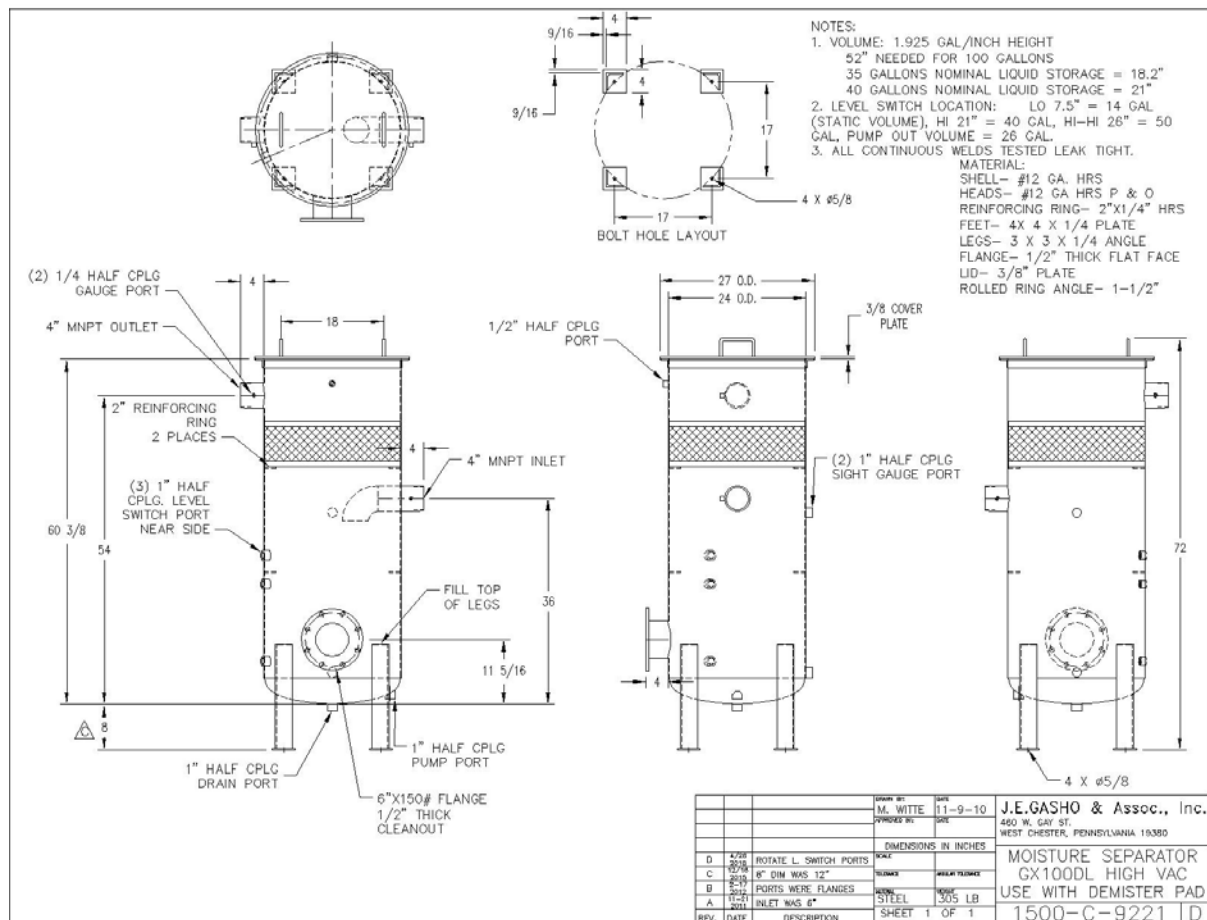
Integral SS demister / filter media, 99.5% entrained water removal

Pressure drop through clean media = .25 IWC

External Site Gauge, 1" ports for clear tube sight gauge

Level Switch Ports- (3) 1" NPT ports

4" MNPT inlet and outlet





The Leader in Blower & Vacuum Solutions

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J. E. Gasho and Associates, Inc.  
460 West Gay Street, West Chester, PA 19380  
ph 610.692.5650 fax 610.692.5837

## Moisture Separator Operating and Maintenance Instructions

### **Operation:**

The moisture separator is a static vessel with no moving parts. It removes moisture by reducing the flow rate of incoming air and allowing the entrained moisture to coalesce and precipitate.

### **Maintenance:**

The moisture separator has been designed to require minimal maintenance.

During normal operation a layer of sludge may build up on the bottom of the separator.

> Open isolating ball valve to drain the sludge. If the unit is furnished with a sludge pump, operate pump until the sludge is removed and only liquid is being removed.

The moisture separator is provided with a clean out port that can be removed and the inside cleaned with water.

Check sight gauge, clean if needed.

Demister material is included in the throat of the moisture separator. It can be inspected and washed through the top opening of the moisture separator.

If there are accessories attached to the moisture separator follow the operating and maintenance instructions for those items



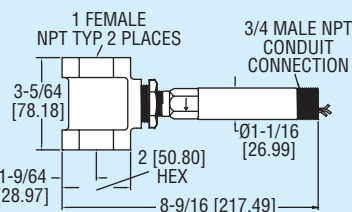
Series  
L6

# FLOTECT® Liquid Level Switch

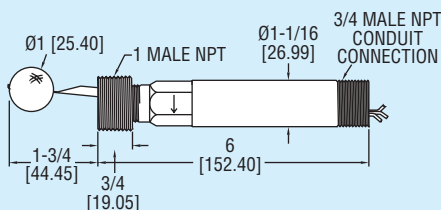
Easy In-wall or External Installation, Up to 2000 psig (138 bar)



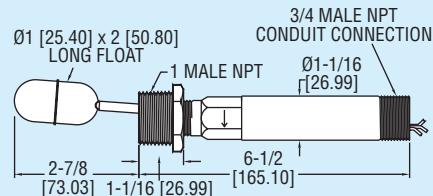
Model L6 with External Float Chamber



Model L6 with Spherical Float



Model L6 with Cylindrical Float



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product video

**Surprisingly compact**, the Series L6 Flotect® Level switch is designed and built for years of trouble-free service in a wide variety of process liquid level applications. Operation is simple and dependable with no mechanical linkage as the level switch is magnetically actuated. The float lever pivoted within the body moves when the process liquid displaces the float. A magnet on the opposite end of the float lever controls a second magnet on the switch actuating lever located in the switch housing.

## FEATURES

- Leak proof lower body machined from bar stock
- Choice of models for direct side wall mounting or mounted in a tee to act as an external float chamber
- Weatherproof
- Explosion-proof (listings included in specifications)
- Electrical assembly can be easily replaced without removing the unit from the installation so that the process does not have to be shut down
- Sensitive to level changes of less than 1/2" (12 mm)

Model	Body	Installation	Float Material	Max. Pressure psig (bar)	Min. Sp. Gr.
L6EPB-B-S-3-O	Brass	Side Wall Mounting	Polypropylene	1000 (69)	0.9
L6EPB-B-S-3-A	Brass	Side Wall Mounting	Spherical	200 (13.8)	0.5
L6EPB-B-S-3-C	Brass	Side Wall Mounting	Cylindrical	350 (24.1)	0.7
L6EPB-B-S-3-B	Brass	Brass External Float Chamber (Tee)	Spherical	250 (17.2)	0.9
L6EPB-B-S-3-H	Brass	Brass External Float Chamber (Tee)	Spherical	250 (17.2)	0.7
L6EPS-S-S-3-O	303 SS	Side Wall Mounting	Polypropylene	2000 (138)	0.9
L6EPS-S-S-3-A	303 SS	Side Wall Mounting	Spherical	200 (13.8)	0.5
L6EPS-S-S-3-C	303 SS	Side Wall Mounting	Cylindrical	350 (24.1)	0.7
L6EPS-S-S-3-S	303 SS	304 SS External Float Chamber (Tee)	Spherical	2000 (138)	0.9
L6EPS-S-S-3-L	303 SS	304 SS External Float Chamber (Tee)	Spherical	350 (24.1)	0.7

## OPTIONS

**Gold Plated Contacts** option for dry circuits, add suffix **-MV** (see electrical rating in specifications)

**High Temperature** option rated 400°F (204°C), add suffix **-MT** (see electrical rating in specifications, no listings or approvals, only available on models with stainless steel floats)

**CSA and UL approved construction**, includes weatherproof and explosion-proof junction box, add suffix **-CSA**

**ATEX compliant construction** includes, weatherproof and explosion-proof, junction box, add suffix **-AT**

**IECEx certified construction**, add suffix **-IEC**

**DPDT contacts**, change seventh character in model number to "D".

Example: L6EPB-B-D-3-O

**Options Not Shown:** 1-1/2" and 2" male NPT process connection, 2" female NPT connection tee, and top mount.

## SPECIFICATIONS

**Service:** Liquids compatible with wetted materials.

### Wetted Materials:

**Float:** Solid polypropylene or 304 SS.

**Lower Body:** Brass or 303 SS.

**Magnet:** Ceramic.

**External Float Chamber (Tee):** Matches lower body choice of brass or 303 SS.

**Other:** Lever Arm, Spring, Pin, etc.: 301 SS.

**Temperature Limit:** -4 to 220°F (-20 to 105°C) Standard, MT high temperature option 400°F (205°C) (MT not UL, CSA, ATEX, IECEx and KC). ATEX compliant AT, IECEx IEC and KC option ambient temperature -4 to 167°F (-20 to 75°C) process temperature: -4 to 220°F (-20 to 105°C).

**Pressure Limits:** See model chart.

**Enclosure Rating:** Weatherproof and Explosion-proof. Listed with UL and CSA for Class I, Groups A, B, C and D; Class II, Groups E, F, and G. (Group A on stainless steel body models only).

ATEX **CE** 0344 **Ex** II 2 G Ex d IIC T6 Gb Process Temps 75°C.

EC-Type Certificate No.: KEMA 04ATEX2128.

ATEX Standards: EN 60079-0: 2009; EN60079-1: 2007.

IECEx Certified: For Ex d IIC T6 Gb Process Temps 75°C.

IECEx Certificate of Conformity: IECEx DEK II.0039.

IECEx Standards: IEC 60079-00: 2007; IEC 60079-1: 2007.

Korean Certified (KC) for Ex d IIC T6 Gb Process Temps 75°C.

KTL Certificate Number: 2012-2454-75.

**Switch Type:** SPDT snap switch standard, DPDT snap switch optional.

**Electrical Rating:** UL models: 5A @ 125/250 VAC (V~). CSA, ATEX and IECEx models: 5A @ 125/250 VAC (V~); 5A res., 3A ind. @ 30 VDC (V=). MV option: .1A @ 125 VAC (V~). MT option: 5A @ 125/250 VAC (V~). [MT option not UL, CSA, ATEX or IECEx].

**Electrical Connections:** UL models: 18 AWG, 18" (460 mm) long.

ATEX/CSA/IECEx models: terminal block.

**Upper Body:** Brass or 303 SS.

**Conduit Connection:** 3/4" male NPT standard, 3/4" female NPT on junction box models.

**Process Connection:** 1" male NPT on models without external float chamber, 1" female NPT on models with external float chamber.

**Mounting Orientation:** Horizontal with index arrow pointing down.

**Weight:** Approximately 1 lb (.5 kg) without external float chamber, 1.75 lb (.8 kg) with external float chamber.

**Specific Gravity:** See chart.

**Agency Approvals:** ATEX, CE, CSA, IECEx, KTL, UL.

---

**Oil-Rite Corporation**

4325 Clipper Drive, P.O. Box 1207, Manitowoc, WI. 54221-1207

Telephone: (920) 682-6173 Fax: (920) 682-7699

E-Mail: sales@oilrite.com Web site: www.oilrite.com

Oil-Rite Corporation > B-1559-1

**Item # B-1559-1, Level Gages Flush Channel - Steel**[larger image](#)**Level Gages Flush Channel - Steel**

Level Gages Flush Channel - Steel can be mounted flush against the outside surface of a reservoir with only a small amount of protrusion. Liquid level gages for flush mounting are used for a multitude of applications, such as on tanks, reservoirs, packaged hydraulic equipment, large steel mill pumps, hydraulic presses, and for any other application where it is desirable to indicate fluid levels. These level gages are used to determine the liquid level inside a metal reservoir by visual observation of the level in a transparent sight. The clarity and condition of the liquid can also be checked. Models with a thermometer will show the temperature of the liquid as well. Extremely sturdy and rigid, these gages come with glass sights mounted inside the steel channel shield to provide maximum protection against breakage. Visibility of the liquid level is excellent through the large sight opening. A reflector enhances the visibility of the liquid level. Liquid level markings can be added on request. Back mounting gages are used on tanks permitting access to the inside, in order to fasten the nuts on the mounting studs inserted in drilled holes in reservoirs. Front mounting gages are used on reservoirs which do NOT permit access to the inside, therefore, the tanks must have two tapped holes, 1/2 - 20 N.F., to receive the mounting studs, which are fastened from the outside.

---

**Specifications**

<b>Style</b>	Plain
<b>Pressure</b>	125 P.S.I. Max.
<b>Temperature</b>	225° F. Max.
<b>Centerline Distance Between Mtg. Holes</b>	3" to 60"
<b>Body</b>	Steel, Plated (Optional Material Available)
<b>Sight</b>	Red Line Gage Glass
<b>Seals</b>	Buna-N
<b>Mounting Shanks</b>	Steel, Plated 1/2-20 N.F.

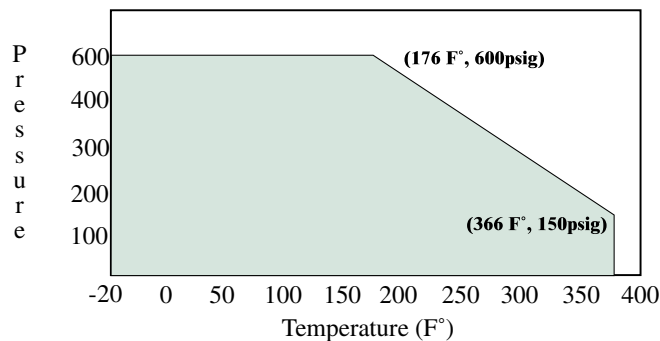
[Print](#)[Back](#)

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# Standards Compliance

IPG's 64 series brass ball valves comply with the latest editions of these published standards:

- AGA Z21.15.CGA9.1
- AGA No. 3-88
- ANSI B1.20.1
- ANSI B16.18
- CAN/CGA-3.16-M88
- ASME/ANSI B16.33
- ASME/ANSI B16.38
- MSS SP-110
- UL Guide YSDT
- UL Guide YRPV
- UL Guide VQGU



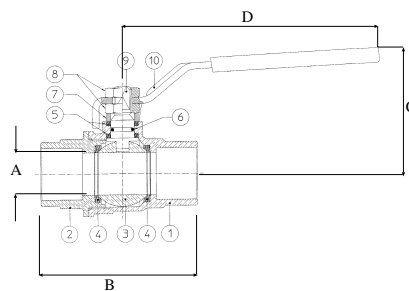
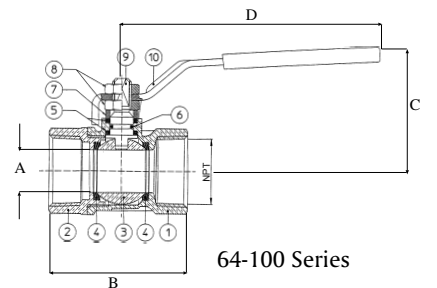
## Materials of Construction

Description	Materials
1. Body	Brass UNI 5705-65
2. Retainer	Brass UNI 5705-65
3. Ball	Brass UNI 5705-65
4. Seats	PTFE
5. Stem Seals	PTFE
6. O-Ring	NBR 75 Shore A
7. Packing Gland	Brass UNI 5705-65
8. Nut	Plated Steel
9. Stem	Brass UNI 5705-65 Cr Plated
10. Lever Handle	Plated Steel 1/4" - 2" Models Aluminum 2 1/2" - 4" Models

## Optional Kits

Valve Size	Locking Handle	Stem Extensions	Balancing Stops
1/4", 3/8" & 1/2"	78-1659-01	78-1501-0	78-1506-01
3/4" & 1"	78-1660-01	78-1502-0	78-1507-01
1-1/4" & 1-1/2"	78-1661-01	78-1503-0	78-1508-01
2"	78-1662-01	78-1504-0	78-1509-01
2-1/2" & 3"	-	78-1505-0	78-1510-01

NOTE: Specify (-07) suffix for T-Handle i.e. 64-105-07.



## 64-100 Dimensional Data

Size	Part No.	A	B	C	D	(Cv)
1/4" NPT	64-101-01	0.39	2.02	1.75	3.85	6
3/8" NPT	64-102-01	0.39	2.02	1.75	3.85	7
1/2" NPT	64-103-01	0.59	2.44	1.88	3.85	19
3/4" NPT	64-104-01	0.78	2.71	2.28	4.80	34
1" NPT	64-105-01	0.98	3.07	2.44	4.80	50
1-1/4" NPT	64-106-01	1.25	3.42	3.07	6.02	104
1-1/2" NPT	64-107-01	1.57	3.89	3.34	6.02	268
2" NPT	64-108-01	1.96	4.33	3.79	6.37	309
2-1/2" NPT	64-109-01	2.56	5.59	5.02	8.07	629
3" NPT	64-100-01	3.15	6.45	5.45	8.07	1018
4" NPT	64-10A-01	3.94	7.60	6.34	10.23	1622

## 64-200 Dimensional Data

Size	Part No.	A	B	C	D	(Cv)
1/2"	64-203-01	0.59	2.53	1.88	3.85	19
3/4"	64-204-01	0.78	2.99	2.28	4.80	34
1"	64-205-01	0.98	3.58	2.44	4.80	50
1-1/4"	64-206-01	1.25	4.09	3.07	6.02	104
1-1/2"	64-207-01	1.57	4.56	3.34	6.02	268
2"	64-208-01	1.96	5.43	3.79	6.37	309
2-1/2"	64-209-01	2.56	6.93	5.02	8.07	629
3"	64-200-01	3.15	8.09	5.45	8.07	1018

**APOLLO**  
INTERNATIONAL  
A Division of Conbraco Industries, Inc.

P.O. Box 247  
Matthews, NC 28106

(704) 841-6000  
Fax: (704) 841-6020  
<http://www.conbraco.com>

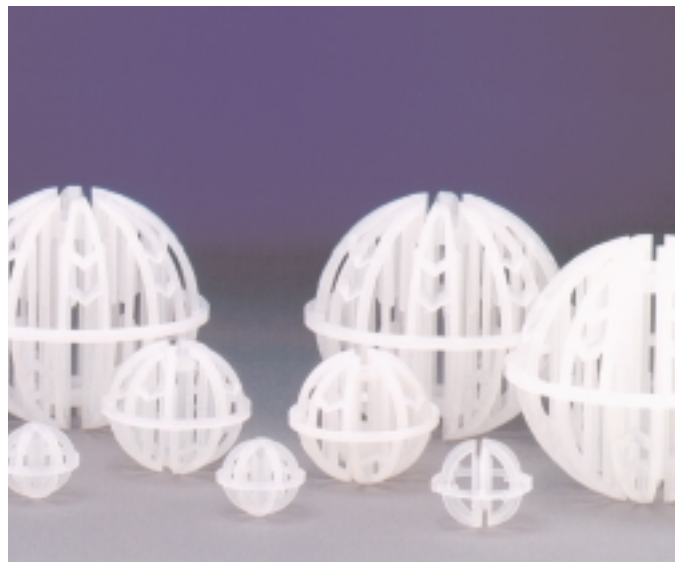
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## Jaeger Tri-Packs®

### Features

- Jaeger Tri-Packs® are hollow, spherical packings made of injection molded plastic, available in four diameters: 1", 1 ¼", 2", and 3 ½".
- Symmetrical geometry made from a unique network of ribs, struts, and drip rods.
- High active surface areas.
- Extremely low pressure drops.
- Extremely high operating capacities.

### Benefits

- High mass and heat transfer rates.
- Excellent gas and liquid dispersion characteristics.
- Resist nesting, making removal easy.
- Installs to packed position - no settling.
- Available in a wide variety of plastics.
- Predictable performance.



Jaeger Tri-Packs®-PP are NSF Certified to ANSI/NSF Standard 61 when made in polypropylene.

# Specifications & Physical Properties

## Materials.

Twelve standard, injection moldable plastics are available:

Polypropylene (PP)	TopEx® (LCP)
Polyethylene (PE)	Kynar® (PVDF)
Polypropylene	Halar® (ECTFE)
Glass-Filled (PPG)	Teflon® (PFA)
Noryl® (PPO)	Tefzel® (ETFE)
Polyvinylchloride (PVC)	Tefzel® Glass-
Corzan™ (CPVC)	Filled (ETFE-G)

Other plastics are available on request.

### IMPORTANT NOTE:

Design data presented in this bulletin are for preliminary calculations only. Contact Jaeger before finalizing calculations.

JAEGER TRI-PACKS® is a Registered Trademark of JAEGER PRODUCTS, INC.

## Properties Table

Size (in.)	1	1 1/4	2	3 1/2
Geometric Surface Area (ft <sup>2</sup> /ft <sup>3</sup> )	85	70	48	38
Packing Factor (1/ft)	28	25	16	12
Void Space (%)	90	92	93.5	95
Bulk Density (lb/ft <sup>3</sup> ) (PP)	6.2	5.6	4.2	3.3

## Maximum Operating Temperatures for Plastic Jaeger Tri-Packs®

Jaeger Tri-Packs® are available in a variety of injection-molded plastics for different applications. The maximum operating temperatures for these different resins vary from material to material and are also affected by specific process variables. The data presented below correspond to maximum continuous operating temperatures at atmospheric pressure and systems that are essentially air and water. The presence of solvents, acids, free radicals, and oxidants needs to be considered. Furthermore, these temperatures correspond to the maximum recommended bed depth for each packing size and material. These maximum bed depths are different depending on the application. Consult with Jaeger in respect to the maximum bed depth for your particular application.

Material	Maximum Temperature (Deg. F) (1 atm, air/water, at max. recommended depth)	Bulk Density Factor
Polyvinyl Chloride (PVC)	140	1.50
Polyethylene (PE)	160	1.02
Polypropylene (PP)	180	1.00
Corzan™ (CPVC)	230	1.74
Chlorinated Polyvinyl Chloride (CPVC)	210	1.74
Polypropylene - Glass-Filled (10-30%) (PP-G)	210-230*	1.17-1.38*
Noryl® (PPO)	230	1.24
Kynar® (PVDF)	280	1.98
Halar® (ECTFE)	290	1.86
Tefzel® (ETFE)	350	1.93
Teflon® (PFA)	400	2.45
Tefzel® - Glass Filled (25% Glass) (ETFE-G)	410	2.2

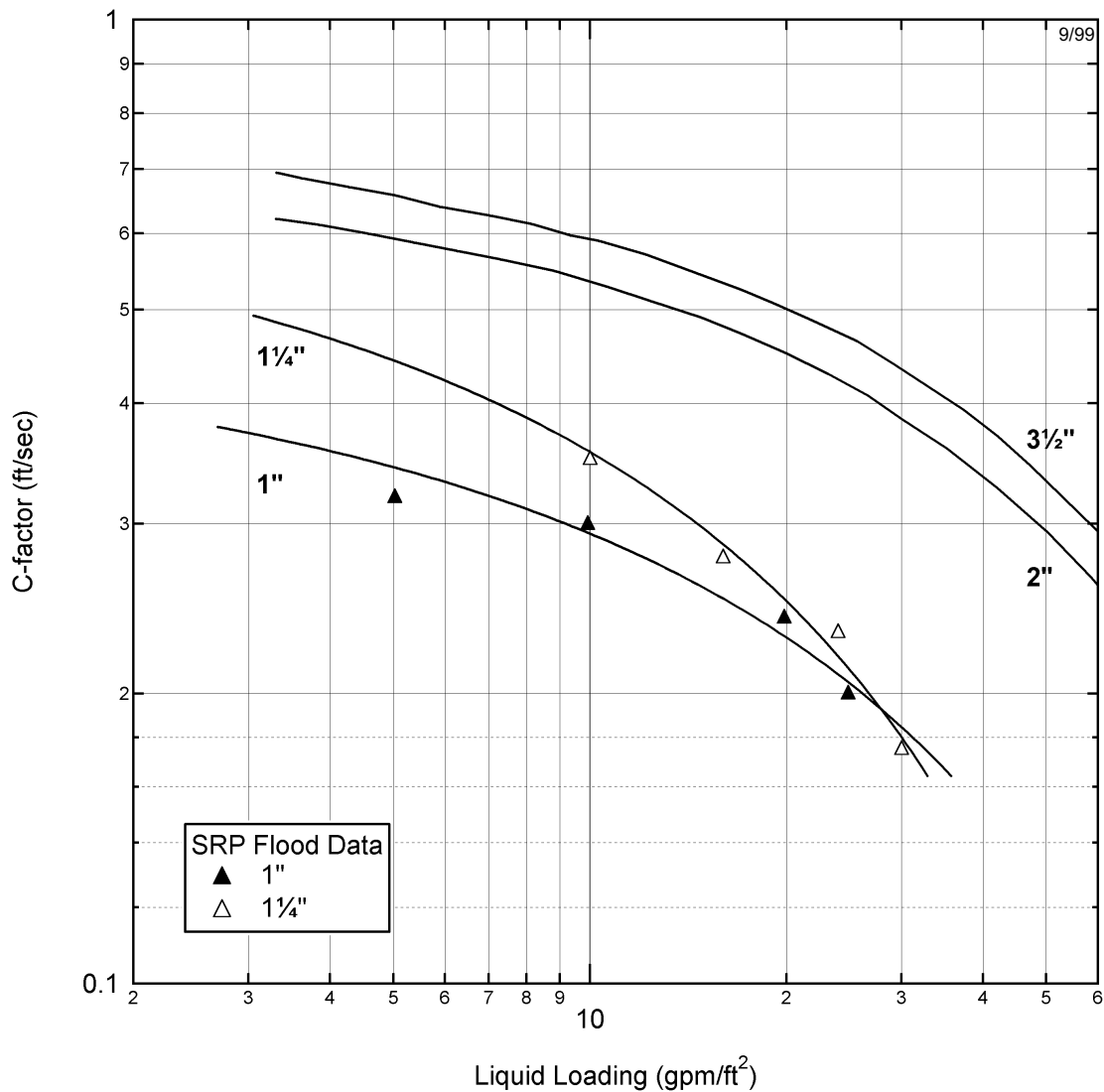
\*Depending on glass content.



# Generalized Flooding Curves

Plastic Jaeger Tri-Packs®

Ambient Air-Water Systems at 1 atm, 70°F



$$C\text{-Factor} = V_s [(\rho_V)/(\rho_L - \rho_V)]^{1/2} \text{ where}$$

$$V_s = \text{Superficial Vapor Velocity in ft/sec}$$

$$\rho_L \text{ and } \rho_V = \text{Density of Liquid and Vapor in lb/ft}^3$$

For Air/Water systems at 70°F & 1 atm: C-Factor x 7776.2 = lb/hr-ft²; gpm/ft² x 499.7 = lb/hr-ft²

# JAEGER

SRP - Separations Research Program, University of Texas at Austin.

1611 Peachleaf St., Houston, Texas 77039

800-678-0345

Phone: 281-449-9500

Fax: 281-449-9400

www.jaeger.com

# Conversion Factors

FROM	TO	MULTIPLY BY	ADD OFFSET
mg/ml	ppm <sub>w</sub>	1.0	
1/ft	1/m	3.2808	
atm	psia	14.696	
atm	psig	14.696	-14.696
atm	torr	760	
C	F	1.8	32
C	K	1	273.15
C-factor (air/water @70°F) ft/se	lb/hr ft <sup>2</sup>	7776.2	
F	K	.5556	255.3722
ft	cm	30.48	
ft	m	.3048	
ft <sup>2</sup> /ft <sup>3</sup>	m <sup>2</sup> /m <sup>3</sup>	3.2808	
ft <sup>3</sup>	gal (US)	7.4805	
ft <sup>3</sup>	m <sup>3</sup>	.0283	
g/cm <sup>3</sup>	lb/ft <sup>3</sup>	62.428	
gm/cm <sup>3</sup>	kg/m <sup>3</sup>	1000	
gpm/ft <sup>2</sup>	lb/hr ft <sup>2</sup> (water @ 70°F)	499.7	
hr	sec	3600	
in	m	.0254	
in wc/ft	dyne/cm <sup>3</sup>	81.5617	
in wc/ft	Pa/m	815.6168	
kg	gm	1000	
kg	lb	2.2046	
kg/m <sup>2</sup> *sec	lb/ft <sup>2</sup> *hr	737.3402	
kg/sec	lb/hr	7936.6829	
kg mole/m <sup>2</sup> *sec	lbmole/ft <sup>2</sup> *hr	737.3402	
kW	hp	1.341	
lb	gm	453.59	
m <sup>2</sup>	cm <sup>2</sup>	10000	
m <sup>2</sup>	ft <sup>2</sup>	10.7639	
m <sup>2</sup> /m <sup>3</sup>	cm <sup>2</sup> /cm <sup>3</sup>	.01	
m <sup>3</sup>	liters	1000	
mg/l	ppm <sub>w</sub>	1.0	
Millions of Gallons/Day	gpm	694.46	
min	sec	60	
ppm <sub>w</sub>	ppb <sub>w</sub>	1000	

# JAEGER

1611 Peachleaf St., Houston, Texas 77039

800-678-0345

Phone: 281-449-9500

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**Model** GH-400

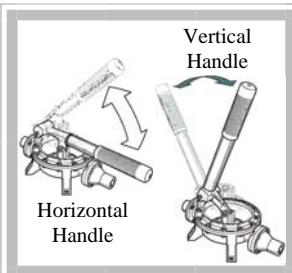
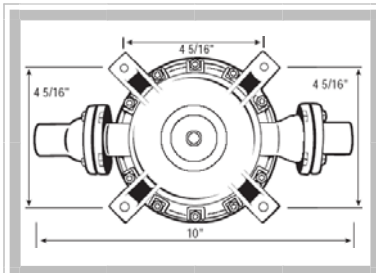
**Description** Hand pump for use with 1/2" to 1 1/4" hose. Available with either horizontal or vertical handle.

**Features**

- Lightweight, economical
- Durable – tough Delrin® plastic
- Clamp ring adjusts to 12 different handle orientations
- Can be configured with either vertical or horizontal handle

#### Performance

Flow Rate	per Stroke	per Minute (@ 90 cycles/min)
	0.44 Qt 0.42 L	10 Gals 37.9 L
<b>Max Pressure</b>	20 psi	1.4 kg/cm <sup>2</sup>
<b>Max Head</b>	12 ft	3.7 m
<b>Max Lift</b>	12 ft	3.7 m








#### Available Materials

<b>Pump Body</b>	Delrin (Gray)
<b>Clamp Ring</b>	Delrin, Epoxy-coated Aluminum
<b>Diaphragm</b>	Buna Nitrile (Buna N), Buna N Double Sided, Buna-N 3-Ply, Neoprene, Viton, EPDM, Urethane, Silicone
<b>Valves</b>	Buna N, Neoprene, Viton, EPDM, Silicone ( <i>Silicone only available with umbrella valve</i> )

#### Dimensions




	Length			Width	Height	
	Body	incl. H. Handle	incl. V. Handle		incl. H. Handle Up	incl. V. Handle Up
in	10 1/4	12 3/4	12	5 1/2	12	13 5/8
cm	26.0	32.39	30.48	13.97	30.48	34.61
<b>Mounting Holes</b>			4	<b>Weight</b>  1.70 lb 0.77 kg		
<b>Mounting Hole Diameter</b>			1/4 in			
<b>Bolt Circle Diameter</b>			6 1/8 in			
<b>Hole-to-Hole Distance</b>			4 5/16 in			

#### Inlet & Outlet Ends & Sizes

						
in	cm	Hose (Smooth)	N.P.T. Female (Tapped Inside)	N.P.T. Male (Threaded Outside)	Male (Threaded Outside) Garden Hose	Barbed
1/2	1.27		•			
3/4	1.91	•	•	•	•	•
1	2.54	<b>S</b>		•		
1 1/8	2.86	•				•
1 1/4	3.18	•				

(S: standard •: optional)

#### Other Options

Item	Standard	Optional
<b>Valves</b>	 Flapper	 Duckbill  Umbrella
<b>Handle Style</b>	Horizontal (H)	Vertical (V) (removable)
<b>Other</b>		Thru Deck Mounting Kit ( <i>only for vertical handle</i> )
		Internal Spring

*Consult factory for other options.*

# Hand-Operated Diaphragm Pumps

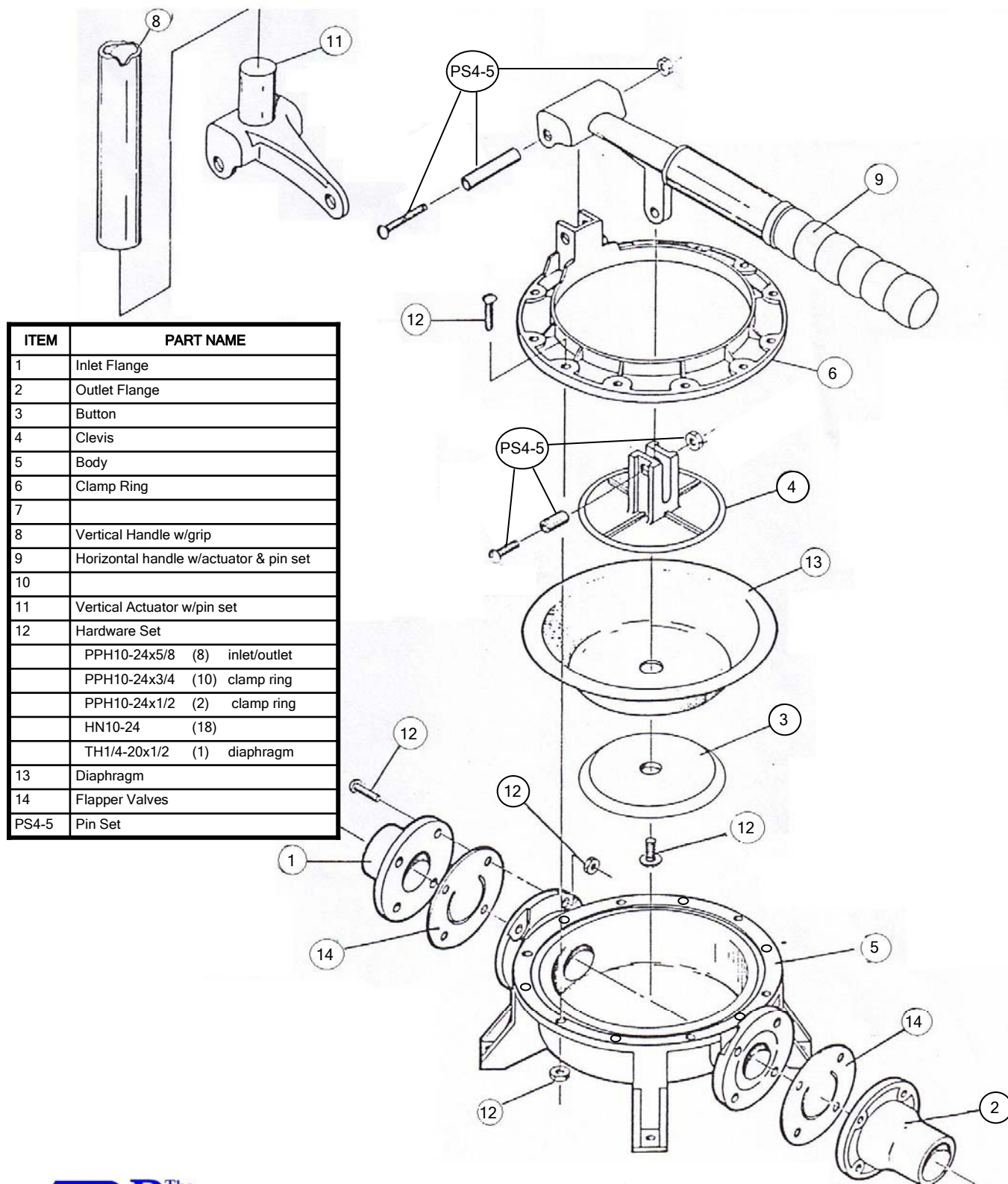


A little elbow grease is all these pumps need to do their job. All pumps have a Delrin housing. Intake and discharge connections are unthreaded male slip-on style. All pumps have check valves, are self-priming, and can be run dry. Not for use with solids. Maximum discharge pressure is 12 feet of head (5 psi). Maximum viscosity is 100,000 centipoise (similar to toothpaste). Temperature range is 33° to 140° F.

## Common Compatible Chemicals

Deionized Water, Diesel Fuel, Glycol, Kerosene, Methanol, Mineral Spirits, Salt Water, Water

Diaphragm Material	Flow Rate, oz/stroke	For Hose ID	Overall Size, Ht. x Wd. x Dp.	
Buna-N	14.08	1"	4 1/2" x 5 1/2" x 12 3/4"	<a href="#">4332K17</a>
Buna-N	21.44	1 1/2"	4 1/2" x 5 1/2" x 13 3/8"	<a href="#">4332K18</a>
Silicone	14.08	1"	4 1/2" x 5 1/2" x 12 3/4"	<a href="#">4332K37</a>



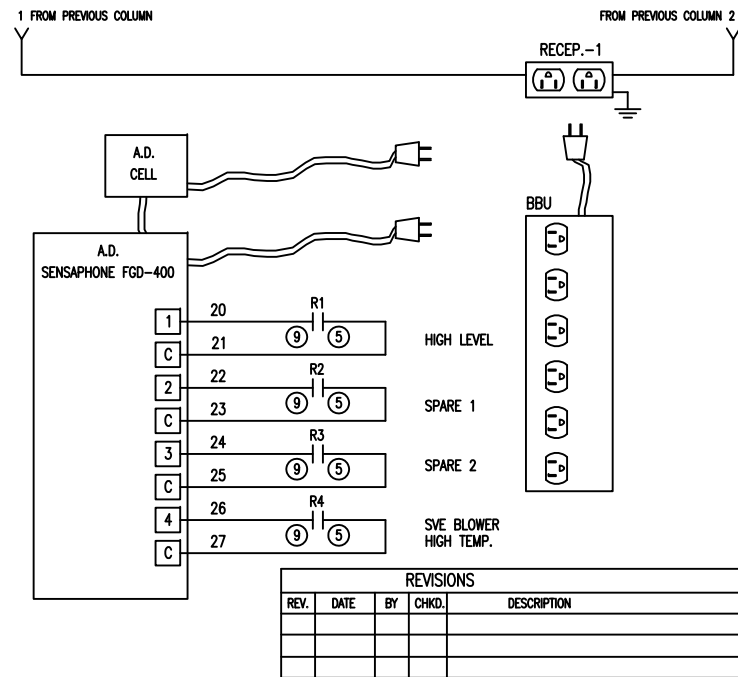
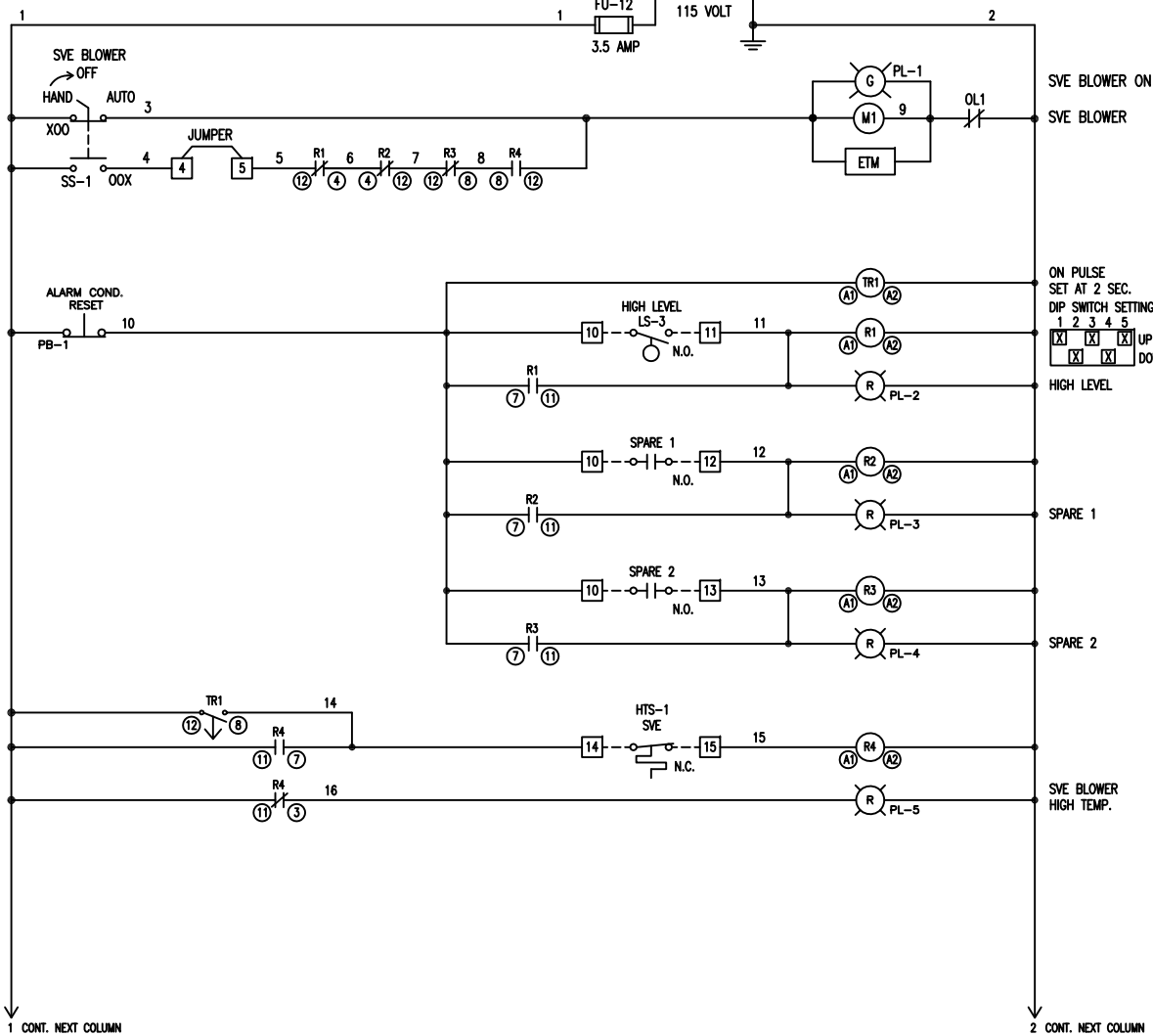
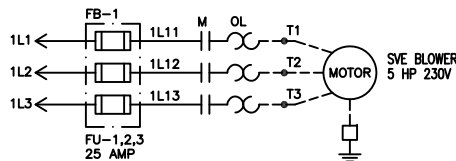
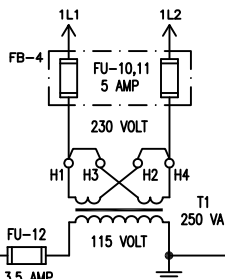
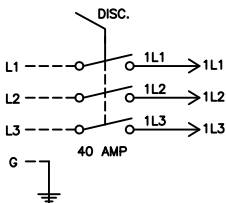
## Guzzler® GH-400

930 Waterman Avenue East Providence, RI 02914  
 Ph: 401-438-1110 888-438-1110 Fax: 401-438-2713  
[www.thebosworthco.com](http://www.thebosworthco.com)

SUITABLE FOR USE ON A CIRCUIT CAPABLE OF DELIVERING NOT MORE THAN 5K<sub>a</sub> RMS SYMMETRICAL AMPERES, 240 VOLTS MAXIMUM

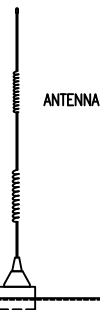
UPSTREAM PROTECTION:  
FUSIBLE DISCONNECT OR CIRCUIT BREAKER  
MUST BE PROVIDED BY INSTALLER AS PER  
STATE AND LOCAL REQUIREMENTS.

SUPPLY:  
230 V  
3PH  
60HZ

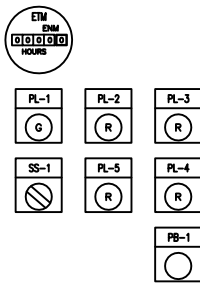


REVISIONS				
REV.	DATE	BY	CHKD.	DESCRIPTION

J.E. GASHO & ASSOCIATES PO# 81804-3264		THIS DOCUMENT IS THE PROPERTY OF INTERNATIONAL CONTROL PRODUCTS. THE EXPLOITATION OR TRANSFER OF ANY INFORMATION HEREIN IS NOT PERMITTED IN THE ABSENCE OF ANY AGREEMENT WITH INTERNATIONAL CONTROL PRODUCTS AND ANY INFORMATION CONTAINED IN THIS DOCUMENT MAY NOT BE RELEASED WITHOUT THE CONSENT OF INTERNATIONAL CONTROL PRODUCTS.			
ICP S.O.# XXX		TITLE BLOWER CONTROL PANEL			
HP	5	DATE	PAGE	DWG NO.	INTERNATIONAL CONTROL PRODUCTS, INC.
VOLTAGE	230/3/60	5/29/18	1 OF 2	GASH213	

**NOTES:**

1. ☐ INDICATES TERMINAL BLOCK
2. ☐ INDICATES COMPONENT TERMINAL POINT
3. USE COPPER WIRE ONLY
4. REPLACE WITH LIKE FUSES ONLY
5. HTS - INDICATES TEMPERATURE SWITCH
6. LS - INDICATES LEVEL SWITCH
7. ALL CONTACTS SHOWN WITH POWER OFF
8. UL LISTED CONTROL PANEL
9. TORQUE TERMINAL BLOCK TO 5-7 LB-IN
10. APPROX 150LBS

**DOOR LAYOUT**

PL-1 SVE BLOWER ON  
PL-2 HIGH LEVEL  
PL-3 SPARE 1  
PL-4 SPARE 2  
PL-5 SVE BLOWER HIGH TEMP.  
SS-1 SVE BLOWER HAND-OFF-AUTO  
PB-1 ALARM COND. RESET



REVISIONS				
REV.	DATE	BY	CHKD.	DESCRIPTION

**BILL OF MATERIALS**

ITEM	QTY	ITEM LABEL	MFG.	DESCRIPTION	PART NUMBER
1	1	ENCL	RITTAL	30x24x8 NEMA 4 ENCLOSURE	AE1076.500
2	2	ENCL	RITTAL	SCREWDRIER INSERT	SZ2464.000
3	1	DISC.	ABB	3P 40 AMP DISCONNECT	OT40F3
4	1	DISC.	ABB	NEMA 4 DISCONNECT HANDLE	OHB65L6
5	1	DISC.	ABB	DISCONNECT SHAFT	OSP6X210
6	1	FB-1	MERSEN	3P 30A CLASS J FUSE BLOCK	60308SJ
7	3	FU1,2,3	MERSEN	25 AMP CLASS J FUSE	AJT25
8	1	M	SIEMENS	25 AMP IEC CONTACTOR	3RT2026-1AK60
9	1	OL	SIEMENS	OVERLOAD RELAY (14-20 FLA)	3RU2126-4BB0
10	1	SS-1	ABB	3 POS. S.S. SPRG. RET. L TO C (2 N.O.)	M3SS7-30B-20
11	1	PL-1	ABB	GREEN F.V. PILOT LIGHT - 120V	CL-100G
12	4	PL-2,3,4,5	ABB	RED F.V. PILOT LIGHT - 120V	CL-100R
13	1	PB-1	ABB	BLACK FLUSH P.B. (1 N.C.)	MP1-30B-01
14	1	ETM	ENM	ELAPSED TIME METER	T50B2-12
15	1	T1	SIEMENS	250VA CONTROL TRANSFORMER	MT0250A
16	1	FB-4	MERSEN	2P 30A CLASS CC FUSE BLOCK	30322R
17	2	FU-10,11	MERSEN	5 AMP CLASS CC FUSE	ATDR5
18	1	FU-12	MERSEN	3 1/2 AMP TIME DELAY FUSE	TRM3 1/2
19	4	R1,2,3,4	FINDER	4 POLE RELAY - 120V	56.34.8.120.0040
20	4	R1,2,3,4	FINDER	4 POLE RELAY SOCKET	96.74
21	1	A.D.	SENSAPHONE	4 CHANNEL AUTO DIALER	FGD-400
22	1	A.D.	SENSAPHONE	A.D. CELLULAR (VERIZON)	FT2260
23	1	BBU	APC	UNINTERRUPTIBLE POWER SUPPLY	APC-BE425M
24	1	ANT.	WILSON	OMNI-DIRECTIONAL NMO ANTENNA	311104
25	1	ANT.	WILSON	NMO ANTENNA MOUNT	905814
26	1	RECEPT.	RED DOT	RECEPTACLE BOX	RIH31LM
27	1	RECEPT.	LEVITON	GFCI RECEPTACLE	GFNT1-W
28	12	T.B.'S	PHOENIX	TERMINAL BLOCK	3004362
29	1	T.B.'S	PHOENIX	TERMINAL BLOCK END COVER	3003020
30	2	T.B.'S	PHOENIX	DIN RAIL END RETAINER	0800886
31	2	GROUND	BURNDY	14-2 AWG GROUND LUG	DLA2
32					

J.E. GASHO & ASSOCIATES  
PO# 81804-3264

ICP S.O.# XXX

HP 5  
VOLTAGE 230/3/60

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DATE	PAGE	DWG NO.	INTERNATIONAL CONTROL PRODUCTS, INC.
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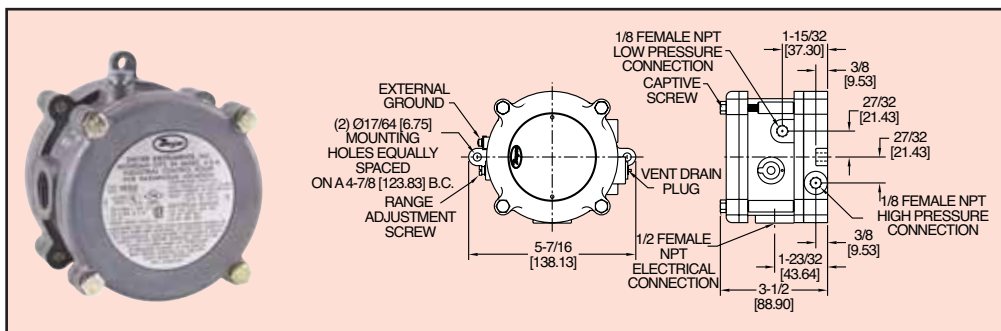




Series  
1950

# Explosion-proof Differential Pressure Switches

Compact, Low Cost, Explosion-proof and Weatherproof



**Model 1950 Explosion-Proof Differential Pressure Switch** combines the best features of the popular Dwyer® Series 1900 Pressure Switch with an integral explosion-proof and weatherproof housing, making it an exceptional value for either application. It is CE, UL and CSA listed, FM approved for use in Class I, Div 1, Groups C and D, Class II Groups E, F, and G and Class III hazardous atmospheres (NEMA 7 & 9), Raintight (NEMA 3). Weatherproof features include a drain plug and O-ring seal in cover. Electrical connections are easily made by removing front cover. For convenience the set point adjustment screw is located on the outside of the housing. Twelve models offer set points from .03 to 20" w.c. (7.5 to 5 kPa) and from .5 to 50 psi (0.035 to 3.5 bar). The unit is very light and compact – about half the weight and bulk of other explosion-proof or weather-proof switches with separate enclosures.

## SPECIFICATIONS

**Service:** Air and non-combustible, compatible gases.

**Wetted Materials:** Consult factory.

**Temperature Limits:** -40 to 140°F (-40 to 60°C); 0 to 140°F (-17.8 to 60°C) for 1950P-8, 15, 25, and 50. -30 to 130°F (-34.4 to 54.4°C) for 1950-02.

## Pressure Limits:

Continuous: 1950's - 45" w.c. (0.11 bar); 1950P's - 35 psi (2.41 bar); 1950P-50 only - 70 psi (4.83 bar).

Surge: 1950's - 10 psi (0.69 bar), 1950P's - 50 psi (3.45 bar), 1950P-50 only - 90 psi (6.21 bar).

**Enclosure Rating:** IP64, NEMA 3, 7 and 9.

**Switch Type:** Single-pole double-throw (SPDT).

**Electrical Rating:** 15 A @ 125, 250, 480 VAC, 60 Hz. Resistive 1/8 HP @ 125 VAC, 1/4 HP @ 250 VAC, 60 Hz.

**Electrical Connections:** 3 screw type, common, normally open and normally closed.

**Process Connections:** 1/8" female NPT.

**Mounting Orientation:** Diaphragm in vertical position. Consult factory for other position orientations.

**Set Point Adjustment:** Screw type on top of housing.

**Weight:** 3.25 lb (1.5 kg); 1950-02 model, 4.4 lb (2 kg).

**Agency Approvals:** CE, UL, CSA, FM.

## SERIES 1950 SWITCHES - MODELS, OPERATING RANGES AND DEAD BANDS

Model Number	Range, Inches W.C.	Approximate Dead Band at	
		Min. Set Point	Max. Set Point
1950-02-2S	.03 to .10	.025	.05
1950-00-2F	.07 to .15	.04	.05
1950-0-2F	.15 to .50	.10	.15
1950-1-2F	.4 to 1.6	.15	.20
1950-5-2F	1.4 to 5.5	.30	.40
1950-10-2F	3 to 11	.40	.50
1950-20-2F	4 to 20	.40	.60

Model* Number	Range, PSID	Approximate Dead Band at	
		Min. Set Point	Max. Set Point
1950P-2-2F	0.5 to 2	.3	.3
1950P-8-2F	1.5 to 8	1.0	1.0
1950P-15-2F	3 to 15	.9	.9
1950P-25-2F	4 to 25	.7	.7
1950P-50-2F	15 to 50	1.0	1.5

CAUTION: For use only with air or compatible gases. Applications with hazardous atmospheres and a single positive pressure may require special venting.

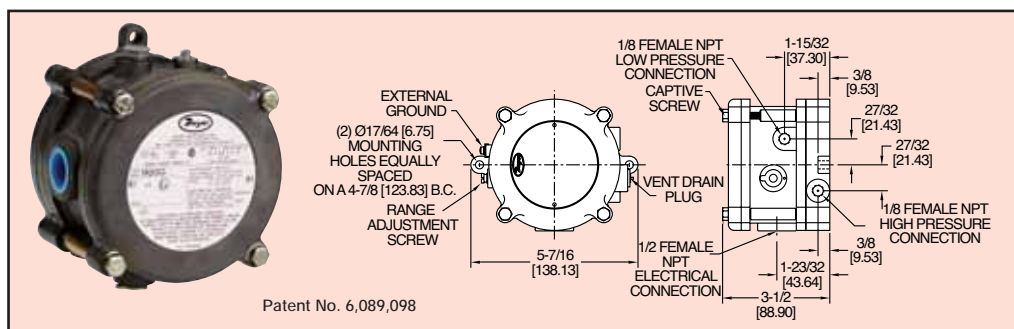
\*P=PSID range models



Series  
1950G

# Explosion-proof Differential Pressure Switch

Explosion-proof, Weatherproof, Compatible with Natural Gases



Patent No. 6,089,098

**The Model 1950G Explosion-Proof Switch** combines the best features of the popular Dwyer® Series 1950 Pressure Switch with the benefit of natural gas compatibility. Units are rain-tight for outdoor installations, and are UL listed for use in Class I, Groups A, B, C, & D; Class II, Groups E, F, & G and Class III atmospheres, Directive 94/9/EC (ATEX) Compliant for **CE** 11 2 G EExd IIB & Hydrogen T6 and CSA & FM approved for Class I, Div 1, Groups B, C, D; Class II, Div 1, Groups E, F, G and Class III atmospheres. The 1950G is very compact, about half the weight and bulk of equivalent conventional explosion-proof switches.

Easy access to the SPDT relay and power supply terminals is provided by removing the top plate of the aluminum housing. A supply voltage of 24 VDC, 120 or 240 VAC is required. A captive screw allows the cover to swing aside while remaining attached to the unit. Adjustment to the set point of the switch can be made without disassembly of the housing.

## SPECIFICATIONS

**Service:** Air and compatible combustible gases.

**Wetted Materials:** Contact Factory.

**Temperature Limits:** 0 to 140°F (-17 to 60°C). Note: Set point drift may occur with ambient temperature changes.

**Pressure Limits:** 45" w.c. (11.2 kPa) continuous; 10 psig (68.95 kPa) surge.

**Enclosure Rating:** IP64, NEMA 3, 7 and 9.

**Switch Type:** 1 Form C relay (SPDT).

**Electrical Rating:** 10A, 120/240 VAC, 28 VDC. Resistive 50mA, 125 VDC.

**Power Requirements:** 24 VDC ±10%. 120 or 240 VAC ±10% optional.

**Electrical Connections:** Internal terminal block.

**Process Connections:** 1/8" female NPT.

**Mounting Orientation:** Diaphragm in vertical position. Consult factory for other position orientations.

**Set Point Adjustment:** Screw type on top of housing.

**Weight:** 2 lb, 15.7 oz (1.35 kg).

**Agency Approvals:** CE, UL, CSA, FM, ATEX.

## MODELS

Model Number <sup>1</sup>	Range, Inches W.C.	Approximate Dead Band at	
		Min. Set Point	Max. Set Point
1950G-00-B-24-NA	.07 to .15	.04	.06
1950G-0-B-24-NA	.15 to .50	.06	.11
1950G-1-B-24-NA	.4 to 1.6	.11	.29
1950G-5-B-24-NA	1.4 to 5.5	.4	.9
1950G-10-B-24-NA	3 to 11	.9	1.8
1950G-20-B-24-NA	4 to 20	1.2	3.0

<sup>1</sup>Note: For alternate supply voltages change 24 to 120 or 240. Example: 1950G-00-B-120. For ATEX approved models remove "NA".



# SENSAPHONE®

## REMOTE MONITORING SOLUTIONS

Sensaphone 400 & 800

### Technical Specifications



### INPUT ZONES

Number of Zones: 400 - 4, 800 - 8

Zone Connector: terminal block

#### Zone Types:

N.O./N.C. contact,

2.8K Thermistor -20° to 150°F | -30° to 65°C

**Zone Characteristics:** 5.11K to 2.85V (Short circuit current: 1mA max.)

**A/D Converter Resolution:** 10 bits  $\pm 2$  LSB

**Zone Protection:** 5.5VDC Metal Oxide Varistor with fast acting diode clamps.

### RELAY OUTPUT

Rated for 1A 30VAC/1A 30VDC maximum.

### LED INDICATORS

System On, Phone In Use, Alarm, Battery Ok.

### MICROPHONE

**Internal Electret Condenser:** For listening in to on-site sounds and detecting high sound levels.

### PHONE INTERFACE

**Line RJ11 Jack:** For connection to a two-wire analog telephone line. (6' modular cord included)

**Extension RJ11 Jack w/ Line Seizure:** For connecting other devices on the same telephone line, devices connected to this jack are disconnected in the event that the 400 must dial out for an alarm.

**Phone Line Protection:** Metal Oxide Varistor & self-resetting fuse

### POWER SUPPLY

**Power Supply:** 120VAC/9VDC 60Hz 6W wall plug-in transformer w/6' cord.

**Power Consumption:** 1.5 Watts

**Power Protection:** Metal Oxide Varistor

**Battery Backup:** Six size-C alkaline batteries (not included), providing up to 24 hours of back-up time.

### ENVIRONMENTAL

**Operating Temperature:**

32° to 122°F | 0° to 50°C

**Operating Humidity:**

0–90% RH non-condensing

**Storage Temperature:**

32° to 140°F | 0° to 60°C

### PHYSICAL

**Dimensions:** 2.1 x 7.8 x 8.8”d | 5 x 20 x 22mm

**Weight:** 8 lbs. | 3.6kg

**Enclosure:** Indoor rated plastic housing suitable for wall or desktop installation

# SENSAPHONE®

REMOTE MONITORING SOLUTIONS

## SENSAPHONE® 400 User's Manual



Stay informed and in control of vital environmental conditions and processes with the fully-programmable Sensaphone 400.



SENSAPHONE®

# ***Model 400***

## ***User's Manual***

Version 1.5.4

## SENSAPHONE 400 User's Manual

Every effort has been made to ensure that the information in this document is complete, accurate and up-to-date. PHONETICS, Inc. assumes no responsibility for the results of errors beyond its control. PHONETICS, Inc. also cannot guarantee that changes in equipment made by other manufacturers, and referred to in this manual, will not affect the applicability of the information in this manual.

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First Edition, version 1.5.4, March 2015

Written and produced by Sensaphone.

Please address all comments on this publication to:

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Aston, PA 19014

[www.sensaphone.com](http://www.sensaphone.com)

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## IMPORTANT SAFETY INSTRUCTIONS

Your Model 400 has been carefully designed to give you years of safe, reliable performance. As with all electrical equipment, however, there are a few basic precautions you should take to avoid hurting yourself or damaging the unit:

- Read the installation and operating instructions in this manual carefully. Be sure to save it for future reference.
- Read and follow all warning and instruction labels on the product itself.
- To protect the Model 400 from overheating, make sure all openings on the unit are not blocked. Do not place on or near a heat source, such as a radiator or heat register.
- Do not use your Model 400 near water, or spill liquid of any kind into it.
- Be certain that your power source matches the rating listed on the AC power transformer. If you're not sure of the type of power supply to your facility, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
- Do not overload wall outlets and extension cords, as this can result in the risk of fire or electric shock.
- Never push objects of any kind into this product through ventilation holes as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock.
- To reduce the risk of electric shock, do not disassemble this product, but return it to Sensaphone Customer Service, or other approved repair facility, when any service or repair work is required. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock when the unit is subsequently used.
- If anything happens that indicates that your Model 400 is not working properly or has been damaged, unplug it immediately and follow the procedures in Appendix F for having it serviced. Return the unit for servicing under the following conditions:
  1. The power cord or plug is frayed or damaged.
  2. Liquid has been spilled into the product or it has been exposed to water.
  3. The unit has been dropped, or the cabinet is damaged.
  4. The unit doesn't function normally when you're following the operating instructions.

- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
- Do not use the telephone to report a gas leak in the vicinity of the leak.

### CAUTION

To Reduce the Risk of Fire or Injury to Persons, Read and Follow these Instructions:

1. Use only the following type and size batteries:  
Alkaline, size C.
2. Do not dispose of the batteries in a fire. The cell may explode. Check with local codes for possible special disposal instructions.
3. Do not open or mutilate the batteries. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.
4. Exercise care in handling batteries in order not to short the battery with conducting materials such as rings, bracelets, and keys. The battery or conductor may overheat and cause burns.
5. Do not mix old and new batteries in this product.

### FCC Requirements

Part 68: The Sensaphone® Model 400 complies with Part 68 of the FCC rules. On the back of the unit there is a label that contains, among other information, the FCC Registration Number and the Ringer Equivalence Number (REN) for this equipment. You must, upon request, provide this information to your local telephone company.

The REN is useful to determine the quantity of devices that you may connect to your telephone line and still have all of those devices ring when your telephone number is called. In most, but not all areas, the sum of the RENs of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices that you may connect to your line, you may want to contact your local telephone company to determine the maximum REN for your calling area.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

Should the Model 400 cause harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice isn't practical, the telephone company may temporarily discontinue service without notice and you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC. The telephone company may make changes in its facilities, equipment, operations, or procedures where

such action is reasonably required in the operation of its business and is not inconsistent with the rules and regulations of the FCC that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this equipment, or you need information on obtaining service or repairs, please contact:

PHONETICS, INC.

901 Tryens Road, Aston, PA 19014

877-373-2700 Fax: 610-558-0222

The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning.

Part 15: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.



## **Canadian Department of Communications Statement**

Notice: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, where the company's inside wiring is associated with a single line, individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

**CAUTION:** Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device to prevent overloading. The termination on loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100. For the Sensaphone® Model 400, the Load Number is 0.3.

# 1 YEAR LIMITED WARRANTY

PLEASE READ THIS WARRANTY CAREFULLY BEFORE USING THE PRODUCT.

THIS LIMITED WARRANTY CONTAINS SENSAPHONE'S STANDARD TERMS AND CONDITIONS. WHERE PERMITTED BY THE APPLICABLE LAW, BY KEEPING YOUR SENSAPHONE PRODUCT BEYOND THIRTY (30) DAYS AFTER THE DATE OF DELIVERY, YOU FULLY ACCEPT THE TERMS AND CONDITIONS SET FORTH IN THIS LIMITED WARRANTY.

IN ADDITION, WHERE PERMITTED BY THE APPLICABLE LAW, YOUR INSTALLATION AND/OR USE OF THE PRODUCT CONSTITUTES FULL ACCEPTANCE OF THE TERMS AND CONDITIONS OF THIS LIMITED WARRANTY (HEREINAFTER REFERRED TO AS "LIMITED WARRANTY OR WARRANTY"). IF YOU DO NOT AGREE TO THE TERMS AND CONDITIONS THIS WARRANTY, INCLUDING ANY LIMITATIONS OF WARRANTY, INDEMNIFICATION TERMS OR LIMITATION OF LIABILITY, THEN YOU SHOULD NOT USE THE PRODUCT AND SHOULD RETURN IT TO THE SELLER FOR A REFUND OF THE PURCHASE PRICE. THE LAW MAY VARY BY JURISDICTION AS TO THE APPLICABILITY OF YOUR INSTALLATION OR USE ACTUALLY CONSTITUTING ACCEPTANCE OF THE TERMS AND CONDITIONS HEREIN AND AS TO THE APPLICABILITY OF ANY LIMITATION OF WARRANTY, INDEMNIFICATION TERMS OR LIMITATIONS OF LIABILITY.

1. **WARRANTOR:** In this Warranty, Warrantor shall mean "Dealer, Distributor, and/or Manufacturer."

2. **ELEMENTS OF WARRANTY:** This Product is warranted to be free from defects in materials and craftsmanship with only the limitations and exclusions set out below.

3. **WARRANTY AND REMEDY:** One-Year Warranty — In the event that the Product does not conform to this warranty at any time during the time of one year from original purchase, warrantor will repair the defect and return it to you at no charge.

This warranty shall terminate and be of no further effect at the time the product is: (1) damaged by extraneous cause such as fire, water, lightning, etc. or not maintained as reasonable and necessary; or (2) modified; or (3) improperly installed; or (4) misused; or (5) repaired or serviced by someone other than Warrantors' authorized personnel or someone expressly authorized by Warrantor's to make such service or repairs; (6) used in a manner or purpose for which the product was not intended; or (7) sold by original purchaser.

LIMITED WARRANTY, LIMITATION OF DAMAGES AND DISCLAIMER OF LIABILITY FOR DAMAGES: THE WARRANTOR'S OBLIGATION UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT, AT THE WARRANTOR'S OPTION AS TO REPAIR OR REPLACEMENT. IN NO EVENT SHALL WARRANTORS BE LIABLE OR

RESPONSIBLE FOR PAYMENT OF ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL AND/OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING BUT NOT LIMITED TO ANY LABOR COSTS, PRODUCT COSTS, LOST REVENUE, BUSINESS INTERRUPTION LOSSES, LOST PROFITS, LOSS OF BUSINESS, LOSS OF DATA OR INFORMATION, OR FINANCIAL LOSS, FOR CLAIMS OF ANY NATURE, INCLUDING BUT NOT LIMITED TO CLAIMS IN CONTRACT, BREACH OF WARRANTY OR TORT, AND WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE. IN THE EVENT THAT IT IS DETERMINED IN ANY ADJUDICATION THAT THE LIMITED WARRANTIES OF REPAIR OR REPLACEMENT ARE INAPPLICABLE, THEN THE PURCHASER'S SOLE REMEDY SHALL BE PAYMENT TO THE PURCHASER OF THE ORIGINAL COST OF THE PRODUCT, AND IN NO EVENT SHALL WARRANTORS BE LIABLE OR RESPONSIBLE FOR PAYMENT OF ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL AND/OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING BUT NOT LIMITED TO ANY LOST REVENUE, BUSINESS INTERRUPTION LOSSES, LOST PROFITS, LOSS OF BUSINESS, LOSS OF DATA OR INFORMATION, OR FINANCIAL LOSS, FOR CLAIMS OF ANY NATURE, INCLUDING BUT NOT LIMITED TO CLAIMS IN CONTRACT, BREACH OF WARRANTY OR TORT, AND WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE.

WITHOUT WAIVING ANY PROVISION IN THIS LIMITED WARRANTY, IF A CIRCUMSTANCE ARISES WHERE WARRANTORS ARE FOUND TO BE LIABLE FOR ANY LOSS OR DAMAGE ARISING OUT OF MISTAKES, NEGLIGENCE, OMISSIONS, INTERRUPTIONS, DELAYS, ERRORS OR DEFECTS IN WARRANTORS' PRODUCTS OR SERVICES, SUCH LIABILITY SHALL NOT EXCEED THE TOTAL AMOUNT PAID BY THE CUSTOMER FOR WARRANTORS' PRODUCT AND SERVICES OR \$250.00, WHICHEVER IS GREATER. YOU HEREBY RELEASE WARRANTORS FROM ANY AND ALL OBLIGATIONS, LIABILITIES AND CLAIMS IN EXCESS OF THIS LIMITATION.

INDEMNIFICATION AND COVENANT NOT TO SUE: YOU WILL INDEMNIFY, DEFEND AND HOLD HARMLESS WARRANTORS, THEIR OWNERS, DIRECTORS, OFFICERS, EMPLOYEES, AGENTS, SUPPLIERS OR AFFILIATED COMPANIES, AGAINST ANY AND ALL CLAIMS, DEMANDS OR ACTIONS BASED UPON ANY LOSSES, LIABILITIES, DAMAGES OR COSTS, INCLUDING BUT NOT LIMITED TO DAMAGES THAT ARE DIRECT OR INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL, AND INCLUDING ATTORNEYS FEES AND LEGAL COSTS, THAT MAY RESULT FROM THE INSTALLATION, OPERATION, USE OF, OR INABILITY TO USE WARRANTORS' PRODUCTS AND SERVICES, OR FROM THE FAILURE OF THE WARRANTORS' SYSTEM TO REPORT A GIVEN EVENT OR CONDITION, WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE.

YOU AGREE TO RELEASE, WAIVE, DISCHARGE AND COVENANT NOT TO SUE WARRANTORS, THEIR OWNERS, DIRECTORS, OFFICERS, EMPLOYEES, AGENTS, SUPPLIERS OR AFFILIATED COMPANIES, FOR ANY AND ALL LIABILITIES POTENTIALLY ARISING FROM ANY CLAIM, DEMAND OR ACTION BASED UPON ANY LOSSES, LIABILITIES, DAMAGES

OR COSTS, INCLUDING BUT NOT LIMITED TO DAMAGES THAT ARE DIRECT OR INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL, AND INCLUDING ATTORNEYS FEES AND LEGAL COSTS, THAT MAY RESULT FROM THE INSTALLATION, OPERATION, USE OF, OR INABILITY TO USE WARRANTORS' PRODUCTS AND SERVICES, OR FROM THE FAILURE OF THE WARRANTORS' SYSTEM TO REPORT A GIVEN EVENT OR CONDITION, WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE, EXCEPT AS NECESSARY TO ENFORCE THE EXPRESS TERMS OF THIS LIMITED WARRANTY.

**EXCLUSIVE WARRANTY:** THE LIMITED WARRANTY OR WARRANTIES DESCRIBED HEREIN CONSTITUTE THE SOLE WARRANTY OR WARRANTIES TO THE PURCHASER. ALL IMPLIED WARRANTIES ARE EXPRESSLY DISCLAIMED, INCLUDING: THE WARRANTY OF MERCHANTABILITY AND THE WARRANTY OF FITNESS FOR A PARTICULAR USE AND THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND THE WARRANTY OF NON-INFRINGEMENT AND/OR ANY WARRANTY ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

It must be clear that the Warrantors are not insuring your premises or business or guaranteeing that there will not be damage to your person or property or business if you use this Product. You should maintain insurance coverage sufficient to provide compensation for any loss, damage, or expense that may arise in connection with the use of products or services, even if caused by Warrantors' negligence. The warrantors assume no liability for installation of the Product and/or interruptions of the service due to strikes, riots, floods, fire, and/or any cause beyond Seller's control, further subject to the limitations expressed in any License Agreement or other Agreement provided by Warrantors to purchaser.

The agreement between the Warrantors and the Purchaser, including but not limited to the terms and conditions herein shall not be governed by the Convention for the International Sale of Goods. Where applicable, the Uniform Commercial Code as adopted by the State of Delaware shall apply.

**4. PROCEDURE FOR OBTAINING PERFORMANCE OF WARRANTY:** In the event that the Product does not conform to this warranty, the Product should be shipped or delivered freight prepaid to a Warrantor with evidence of original purchase.

**5. LEGAL REMEDIES AND DISCLAIMER:** Some jurisdictions may not allow, or may place limits upon, the exclusion and/or limitation of implied warranties, incidental damages and/or consequential damages for some types of goods or products sold to consumers and/or the use of indemnification terms. Thus, the exclusions, indemnification terms and limitations set out above may not apply, or may be limited in their application, to you. If the implied warranties can not be excluded, and the applicable law permits limiting the duration of implied warranties, then the implied warranties herein are to be limited to the same duration as the applicable written warranty or warranties herein. The warranty or warranties

herein may give you specific legal rights that will depend upon the applicable law. You may also have other legal rights depending upon the law in your jurisdiction.

**6. CHOICE OF FORUM AND CHOICE OF LAW:** In the event that a dispute arises out of or in connection with this Limited Warranty, then any claims or suits of any kind concerning such disputes shall only and exclusively be brought in either the Court of Common Pleas of Delaware County, Pennsylvania or the United States District Court for the Eastern District of Pennsylvania.

Regardless of the place of contracting or performance, this Limited Warranty and all questions relating to its validity, interpretation, performance and enforcement shall be governed by and construed in accordance with the laws of the State of Delaware, without regard to the principles of conflicts of law.

Effective date 05/01/2004  
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Aston, PA 19014  
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# CHAPTER 1: INTRODUCTION

The Sensaphone® Model 400 is a fully-programmable, environmental monitoring system that offers extensive on-site and remote monitoring capability to small businesses, private homes, farms, greenhouses, computer rooms, and remote facilities. Designed for desktop or wall mounting, the Model 400 is simple to install, program and operate; no changes to standard electrical or telephone service are required. When connected to a telephone line, it will respond to an alarm by dialing up to four separate telephone numbers. When the call is answered, an “Alert Condition” message is delivered in user recordable voice.

The Model 400 features built-in sensors to monitor a variety of conditions:

- High sound level
- AC electric power failure
- Battery backup
- Temperature\*

**\*Note:** While technically not a “built-in” sensor, temperature is factory installed on zone 1.

The 400 is equipped with 4 alert zones. Additional sensors\* can be added to extend monitoring capabilities to include:

- Intrusion or unauthorized entry
- Water leaks and seepage
- Temperature
- Humidity
- Equipment operation
- Many other conditions that may require unique monitoring solutions

\* Refer to Appendix D for information on additional sensors (available separately from Sensaphone) best suited to your application.

The status of each monitored condition is readily obtained at the unit’s installation site, or remotely by telephone. At the close of every Status Report, time is provided for listening to on-site sounds.

To ensure reliable operation, the Model 400 features power backup capability; in the event of AC power failure, six C-cell alkaline batteries (not included) will continue to power the unit for approximately 24 hours.

## **FEATURE SUMMARY**

The Sensaphone 400 includes the following features:

- Four zones configurable as temperature or dry contact
- Each zone can be individually enabled or disabled
- Fully automatic input configuration
- Temperature sensor included on zone #1
- Calibration for each zone
- Power monitor
- High sound-level monitor
- User-recordable voice messages
- Dial out to four telephone numbers
- Alarm dial out via voice and numeric pager
- Microphone for onsite listen-in
- Built-in line seizure
- Relay output (manual or automatic control)
- Four status LEDs
- Surge protection on all zones, telephone line, and power supply
- 24 hour battery backup (batteries not included)
- Wall or desktop installation

## **ABOUT THIS MANUAL**

This manual comprises the instructions and commands for installing and operating the Model 400. The Quick Start chapter is included to speed understanding of programming and operation. Communication and Alarm Programming chapters demonstrate step-by-step methods for utilizing the full range of available features. The Troubleshooting chapter provides assistance in the event that problems are encountered.

## LAYOUT



1. Programming Keypad
2. Power Jack
3. Phone Extension Jack
4. Phone Line Jack
5. Speaker
6. Built in Microphone
7. System on LED
8. Phone-in-use LED
9. Alarm LED
10. Battery OK LED
11. Battery Compartment
12. Input/Output Wiring Door

## LED INDICATORS

The LEDs provide on-site alarm and status information. Listed below are descriptions of how the LEDs work.

### System On

LED Off: Unit is off

LED On: Unit is in Run mode

LED Blinking: Unit is in Standby mode

### Phone-In-Use

LED On: The unit or some other device is communicating on the phone line

LED Off: Phone line is not in use

LED Blinking: No telephone service detected

### Alarm

LED Off: No alarms exist

LED Blinking: Unacknowledged alarm exists

LED On: Acknowledged alarm exists

### **Battery OK**

LED On: Battery condition good

LED Blinking: Battery condition low

LED Off: No battery/critically low battery condition

## **TECHNICAL SUPPORT**

If any questions arise upon installation or operation of the Model 400, please contact the Sensaphone Technical Service Department at the number shown below, and have the following information:

- Date of Purchase \_\_\_\_\_
- Serial number of your Model 400 \_\_\_\_\_

Technical Support is available from 8:00am to 5:00pm EST.

You may also e-mail us at [support@sensaphone.com](mailto:support@sensaphone.com).

SENSAPHONE

901 Tryens Road

Aston, PA 19014

Phone: 877-373-2700

Fax: 610-558-0222

[www.sensaphone.com](http://www.sensaphone.com)

## CHAPTER 2: INSTALLATION

Correctly installing the Model 400 will ensure proper functioning of the unit. Please read the entire chapter before starting the installation process.

Within the packaging will be a Warranty Registration Card. Please take the time to fill this out and mail. The One Year Limited Warranty is explained in the front of this manual.

### 2.1 OPERATING ENVIRONMENT

The Model 400 should be installed and operated in a clean, dry area that provides space for wiring sensors to the screw terminals, near an AC power source and telephone line. Operating temperature ranges from 32° Fahrenheit (0° Celsius) to +122° Fahrenheit (+50° Celsius).

**NOTE:** The Model 400 is a sensitive electronic device. Do not install the Model 400 near strong electrostatic, electromagnetic or radioactive fields. Do not expose to humid environments, fumes, or corrosive vapors.

### 2.2 MOUNTING

**Flat Mount:** Place the Model 400 on top of a desk or other horizontal surface. **Wall Mount:** Mount on a wall with two flathead screws using the keyholes on the back panel of the unit. Place the flathead screws or bolts 4" apart at the desired height from the floor. Hook the unit over the screws and toward the floor. Refer to Figure 2-1.

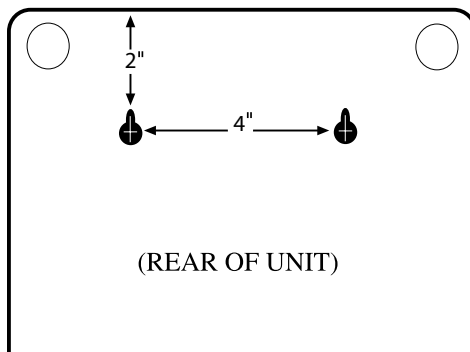


Figure 2-1. Wall Mount

### 2.3 POWER SURGE PROTECTION

The Model 400 can be damaged by power surges and lightning through the telephone line and the 120 VAC power supply. Although the Model 400 has built-in surge protection, we recommend that additional protection be obtained for the unit and for any electronic equipment that is attached



to your power supply and telephone lines. Power surge protection is especially important if you live in a lightning-prone area. The ISOTEL Surge Protector Model IB-4 is available through Sensaphone. See Appendix D.

## 2.4 POWER SUPPLY AND BATTERY BACKUP

The Model 400 is provided with a DC power transformer that will plug into any standard 120 VAC outlet and a battery backup (batteries not included) that enables the unit to continue functioning if AC power is removed (due to electric power disruption or failure). The Model 400 uses six, C-cell alkaline batteries. Do not use rechargeable batteries. Connect the DC power transformer into the jack on the back of the unit and plug the adaptor into a 120VAC outlet

**NOTE:** Be sure that the DC transformer is plugged into an outlet before installing batteries.

To install the batteries, remove the battery compartment door located on the front of the unit below the keypad. Press down and slide the door away from the unit, align batteries according to the diagram shown in Figure 2-2, and replace the hatch.

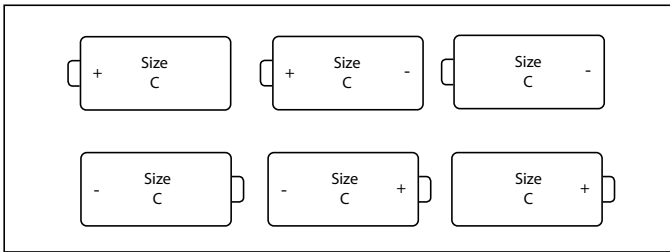


Figure 2-2. Battery Installation

## 2.5 STARTING THE MODEL 400

When the DC power transformer is first plugged into the electrical outlet, the Model 400 automatically starts in RUN mode. The System On light will begin to glow. The unit will respond with, "Hello, this is Sensaphone 400."

## 2.6 RUN MODE AND STANDBY MODE

Pressing the RUN/STANDBY key on the Model 400 keypad will alternately activate or deactivate the unit. If the unit is activated and in RUN mode, the system on light glows steadily. In STANDBY mode, the system on light goes out, but will blink every few seconds to indicate that power is still supplied to the unit.

In RUN mode, the Model 400 is able to receive incoming calls and to dial out automatically in the event of an alarm on one of the monitored conditions. To enter STANDBY mode, press RUN/STANDBY.

As soon as the Model 400 enters STANDBY mode, it responds with “Goodbye.” The system on light immediately goes out and then resumes with a blink every few seconds. While in STANDBY mode, all functions are disabled, but programmed memory is preserved. Upon exiting STANDBY mode, any currently existing alarms will be announced.

**NOTE:** STANDBY mode is not equivalent to “power off”—an electrical source, such as the 120 VAC, or the battery backup, continues to provide full power to the unit. If the unit is placed in STANDBY mode, unplugged from the 120 VAC outlet, and placed in storage, the batteries will continue to power the Model 400, discharging until they fail. Consequently, batteries should always be removed from the unit following disconnection from any 120 VAC outlet, prior to storage.

Press the RUN/STANDBY key again to return to RUN mode.



Figure 2-3. The RUN/STANDBY Key

## 2.7 TELEPHONE LINE

The Model 400 will operate with all standard analog telephone lines that accept pulse or tone dialing. The Model 400 cannot be used on an extension line to dial its own telephone number. Also, it may not be installed on a party line, pay telephone line, or digital telephone system.

Certain private telephone systems and public switching equipment may not accept the Model 400 dialing or may generate an unacceptable ring signal. In those cases, a dedicated line may be required. Consult the supplier of your telephone system if you encounter problems.

If you do not have a modular telephone extension at the Model 400's location, you must contact your local telephone company to have one installed (there is a charge for this service). If you have four-pin jacks, adapters are available to convert them to the modular plugs. Contact your local telephone company or electronics parts store.

**CAUTION:** Never install telephone wiring during a lightning storm. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Use caution when installing or modifying telephone lines.

To install the telephone line, plug one end of the modular cord into the “line” jack on the back of the model 400 (as shown) and plug the other end into any standard RJ11 phone outlet.

Refer to Figure 2-4.

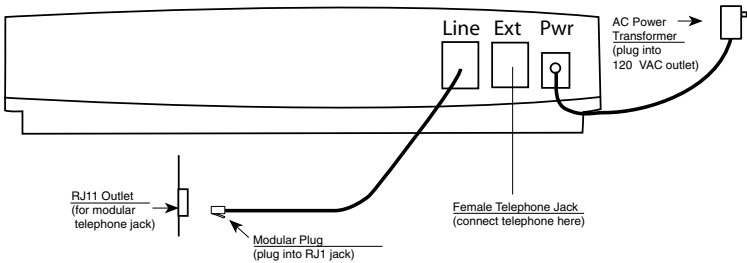
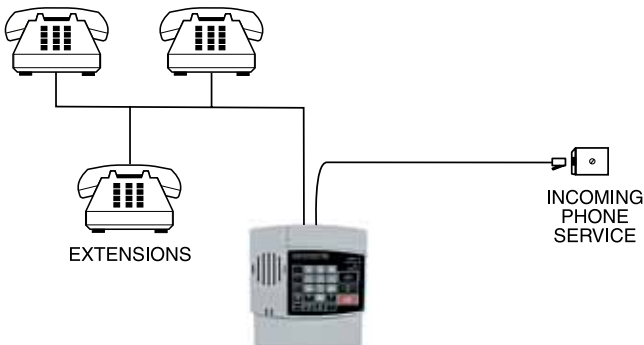


Figure 2-4. Installing the Telephone Line

On the back of the Model 400 is an extra female telephone jack labeled “EXT”. This is provided so that a telephone or other answering device may be used on the same line as the unit. (It is not necessary to hook up a telephone for the Model 400 to operate.) This extension jack features Line Seizure which means that it will disconnect the extension jack when the Model 400 needs to make a telephone call. To ensure that the unit has priority over any other device on the line, you must connect all extensions to this jack. (see figure)

On the unit there are two RJ11C phone jacks:

- The RJ11C jack labeled “LINE” is to be connected to the incoming line of your phone service, ahead of all other phones or telephone extensions.
- The RJ11C telephone jack labeled “EXT” is to be connected to all extensions.



## 2.8 THE MICROPHONE

The Model 400 is provided with a built-in microphone which is used to monitor high sound levels produced near the installation site. The sensitivity of the microphone is configurable and will detect a continuous as well as a pulsating alarm. Note that beeping alarms that have a half second or more of silence between beeps will not be detected.

Other programming options that apply to the microphone include setting the length of time before a high sound causes an alarm.

If this sound level exists for 8 consecutive seconds (default) or for the programmed length of time, the Model 400 will dial out with an alarm message.

**NOTE:** The proximity of the audible alarm to the microphone is extremely important.

Normally, the Model 400 and the audible alarm must be in the same room. The maximum distance can vary considerably depending on the alarm, the acoustics, and the size of the room.

During an alarm dial-out, the microphone allows four-second intervals to listen-in to sounds at the Model 400's location.

When calling for a Status Report, the microphone permits listening to on-site sounds for a programmed time interval.

## 2.9 ALERT ZONES

Open the input/output wiring door located above the keypad. The Model 400 can monitor up to 4 zones (represented by the numbered terminal screws shown in Figure 2-5, below).

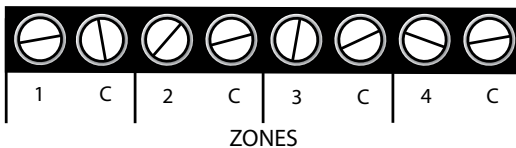


Figure 2-5 Alert Zones

Zones are configured as either dry contact or temperature. A zone configured as dry contact can be used with any normally open (N.O.) or normally closed (N.C.) device. "Open" refers to an opened circuit path; if conditions cause the circuit to close, an alert condition occurs. "Closed" refers to a continuous circuit path; if a closed circuit is opened, an alert condition occurs. The Model 400 determines the way zones are configured by the type of sensor connected to each alert zone (refer to Chapter 5.)

A zone configured as "temperature" is designed to evaluate a range of settings. The Model 400 will read the temperature at the sensor's loca-

tion and compare that value to programmed high and low temperature limits. Temperature zones must be used with Sensaphone's 2.8K Remote Temperature Sensor or weatherproof sensor.

**NOTE:** Before wiring, it is advisable to disable the zones to prevent accidentally tripping an alarm. See Chapter 5.

### **Important Note regarding Ultra-Low temperature freezers:**

If you are connecting the Sensaphone to an ultra low temperature freezer (-80° C) and the freezer is equipped with alarm terminals/contacts you can connect these directly to one of the zones on your Sensaphone (refer to your freezer owner's manual for proper connection).

## **2.10 INSTALLING THE SENSOR**

After you have selected the sensor, loosen the screw of the alert zone and its corresponding common (c). Two wire leads are used to connect any monitoring sensor. Fasten one lead to the numbered screw and the other lead to C. Tighten both screws. If the zone was not disabled, the Model 400 may recite its "Alarm Exists" message as you connect the sensor. If it does, just press ALARM CANCEL to stop it. Re-enable the zone after wiring. Refer to Figures 2-6 and 2-7 for connecting a sensor to an alert zone.

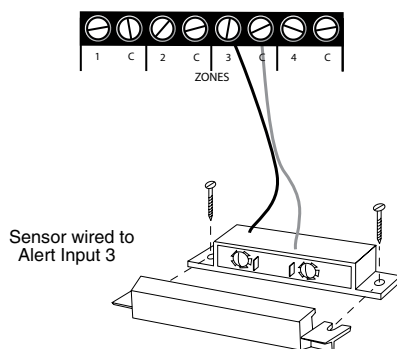


Figure 2-6. Sensor Connected to an Alert Zone

Any sensor can be attached to the Model 400 using 18-26-gauge wire (#22 recommended). The sensor can be several hundred feet from the unit, as long as the total resistance of the circuit is not greater than 50 ohms. Use wire appropriate for the application.

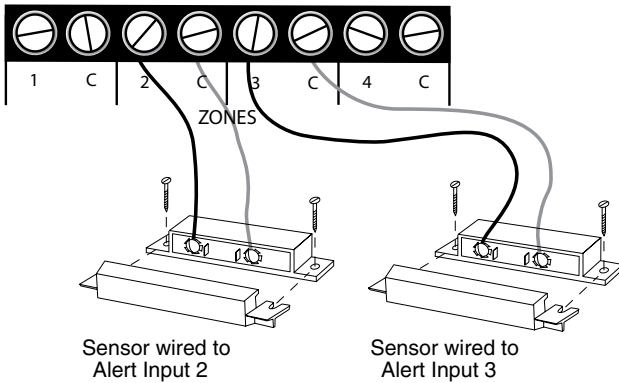


Figure 2-7 Two Sensors Wired to Adjacent Zones

**NOTE:** Do not use sensors, switches, or relays that supply any voltage or current to the Model 400. Be aware of proximity to other electrical wires or components when placing wires that lead from the sensors to the unit. Avoid running the wires near electrical devices that use high voltage or current, such as motors, heavy machinery, etc. This voltage may be inductively coupled into the sensor wiring and could result in damage to the the Model 400's circuitry. Try to place wires at least 6 inches from other electrical wiring or devices.

## 2.11 MULTIPLE SENSORS

The Model 400 may have more than one sensor connected to the same alert zone, as long as the normal condition for each sensor on the same alert zone is identical (either all N.O. or all N.C.). However, only one remote temperature sensor can be used on each zone.

When wiring several normally closed sensors on one zone, they must be connected in series. Connect one lead from the first sensor to the numbered screw of the alert zone. Next, take the other lead from the first sensor and connect it to one lead from the next sensor. Continue connecting sensors end-to-end until you have connected all of your sensors. Take the second lead from the last sensor and connect it to the common screw on the Model 400. See Figure 2-8. Multiple N.C. sensors are typically magnetic reed switches to monitor the security of windows and doors.

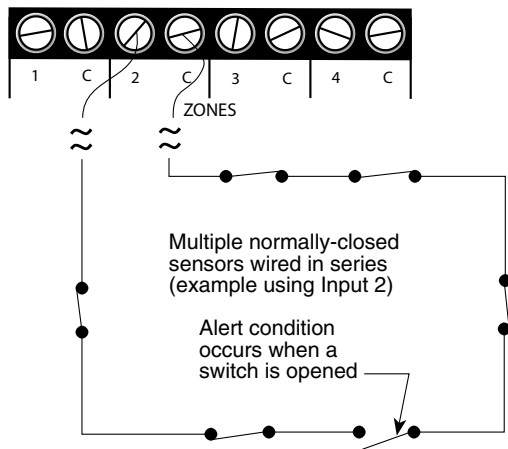


Figure 2-8. Multiple Normally Closed Sensors

To wire several normally open sensors to one alert zone, connect them in parallel. To do this, take one lead from each sensor and attach it to the numbered terminal. Then, take the second lead from each sensor and attach each to the corresponding common screw.

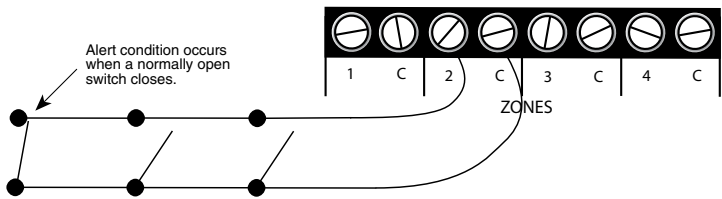


Figure 2-9 Multiple Normally Open Sensors

## 2.12 OUTDOOR WIRING

When wiring sensors outdoors, DO NOT allow exposed wires to run freely in open air; under such conditions, the Model 400 is susceptible to serious damage during a lightning storm. Depending upon the distance outdoor wiring must travel, consideration should be given to the use of shielded wire inside a metal conduit. Both shield and conduit should be connected to an earth ground. This prevents stray voltage from entering the unit.

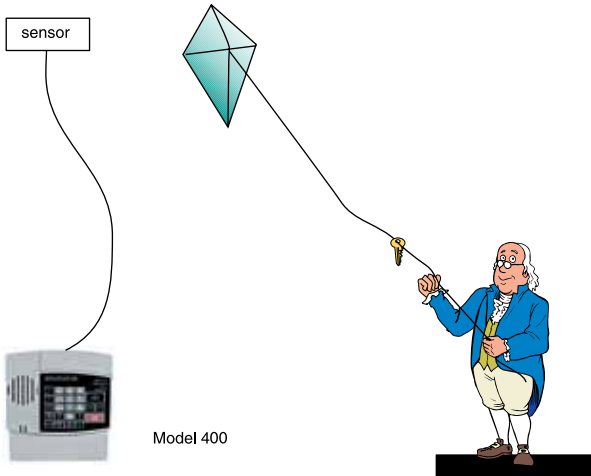


Figure 2-10. Potential Sensor Damage from Stray Electrical Noise

## 2.13 DISCONNECTING THE MODEL 400 FOR STORAGE OR SEASONAL USE.

If you plan to employ the Model 400 as a seasonal “watchdog” for a few months during the year, you must disconnect all wires from the unit completely to avoid damage to the circuitry when the unit is not in use. If the unit is unplugged but left in place with all the sensors still connected, the wires act as antennae that draw in any stray “electrical noise” from such devices as fans, blowers, microwaves, etc.

Additionally, it is important to remove the batteries, or they will discharge until they fail.

Preserve your Model 400 during the off-season, or when not in use:

- Remove the sensor wires at the screw terminals
- Remove the batteries
- Unplug the unit and store in a safe place





## CHAPTER 3: QUICK START

This section presents a useful guide for first-time programming of the Model 400. Follow instructions for installation before attempting to program the Model 400. Refer to Chapter 2: Installation.

### 3.1 THE LOCAL KEYPAD

Programming is accomplished using the local keypad (shown below, Figure 3-1). Notice that a single key has several functions assigned to it; programming results are determined by the order in which keys are pressed.

Individual keystrokes are illustrated to show programming steps in the correct order. If you make a mistake by entering the wrong key, do not press another key until you hear the message “Error 1.” Then, start over with the first key in the programming sequence.

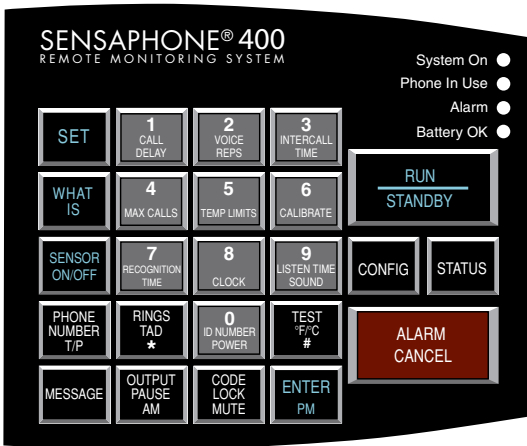


Figure 3-1. The Model 400 Keypad

### 3.2 PREPARATION FOR PROGRAMMING

Read complete instructions in Chapter 2: Installation, and make sure to follow these three steps first:

1. Plug the AC adapter into the 120 VAC outlet.
2. Install the batteries.
3. Connect the Model 400 to a telephone line.

When these steps are completed, the Model 400 is fully operational and able to monitor temperature, high sound, AC power failure and battery backup condition; it can also be called on the telephone for a Status Report or be used for listening to on-site sounds from any remote location. Now, the unit is ready for programming.

### 3.3 QUICK-START PROGRAMMING STEPS

#### STEP 1: SET CONFIGURATION OF ZONES

The Model 400 will scan the 4 external zones and determine if they are N.O. (normally open), N.C. (normally closed), or Temperature. If external sensors are added, make sure they are in their normal positions before proceeding—refer to Chapter 5, Section 5.1.

1. Press STANDBY to place the Model 400 in Standby mode.



2. If you have external sensors available, wire the sensors to the zones on the back of the Model 400 (see Chapter 2, Section 2.10). Otherwise, skip this step and move to step 3.
3. Press RUN. The System On light glows when the Model 400 returns to Run mode.



4. Press SET.



5. Press CONFIGURE.



6. The Model 400 will audibly recite the new configuration for each of the four zones, responding with “normally open”, “normally closed”, or “Temperature.” If a zone is unused, it is treated as normally open.

#### STEP 2: SET THE ID NUMBER

It is recommended that you set the ID number to reflect the telephone number on which the Model 400 is installed.

1. Press SET



2. Press ID NUMBER.



- Using the number keys, enter the digits (up to 16 are permitted) for the ID number. The Model 400 will recite the digits as they are pressed.



- Press ENTER. The 400 will respond: "Okay."



### STEP 3: SET DIAL-OUT TELEPHONE NUMBERS

To program dial-out telephone numbers:

- Press SET.



- Press PHONE NUMBER.



- Select which telephone number to program. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. Model 400 will respond: "Enter number."



4. Enter the complete telephone number using the number keys.

The Model 400 will recite the digits as they are pressed.



5. Press ENTER. The unit will respond: "Okay."



6. Repeat above procedure to program up to four separate telephone numbers.

### STEP 4: SET TEMPERATURE LIMITS

High and low temperature limits can be separately programmed for each zone that is configured as temperature. Limits can range from  $-20^{\circ}$  to  $+150^{\circ}$ F, or from  $-30^{\circ}$  to  $65^{\circ}$ C. Default settings are:  $10^{\circ}$  F for low temperature and  $100^{\circ}$  F for high temperature. Do not set temperature limits too close to normal room temperature, since minor fluctuations could result in frequent and unnecessary alarm dialouts.

1. Press SET.



2. Press TEMP LIMITS.



3. Using the number keys, press a number (from 1 to 4) that corresponds to the temperature zone being programmed.



The Model 400 responds: “Enter low temperature limit.”

4. Using the number keys, enter a value for low temperature limit. The Model 400 will recite the digits as they are pressed. If a negative number is required, first press \*, then enter the number.



5. Press ENTER.



The Model 400 responds: “Enter high temperature limit.”

6. Using the number keys, enter the value for high temperature limit. The Model 400 will recite the digits as they are pressed.



7. Press ENTER. The Model 400 responds: “Enter.”



This concludes minimum programming to achieve normal operation of the Model 400. In addition to the programming just accomplished, default settings for many more features take effect when the unit is first powered. You will be able to reprogram most of these factory-set defaults to suit your application.

For a complete explanation of each feature (with illustrations of key-strokes), refer to Chapter 4: Communications Programming and Chapter 5: Alarm Programming.

To gain a basic understanding of how the alarm dial-out feature works, refer to this chapter, Section 3-4. For extended information regarding dial-out and related programmable parameters, refer to Chapter 7: Operation.

### 3.4 SUMMARY OF THE ALARM DIAL-OUT PROCESS

Action—Response	Programmable Feature
<p><b>1. THE MODEL 400 DETECTS AN ALERT CONDITION</b></p> <p>An alert condition is not the same as a valid alarm—the condition must continue for the programmed time period, or <b>Recognition Time</b>, before it is recognized as a valid alarm.</p>	<ul style="list-style-type: none"> <li>• <b>Recognition Time</b></li> </ul> <p>This is the programmed waiting period to determine if an alert condition has persisted long enough to be considered a valid alarm. If the sensor returns to normal within recognition time, then no alarm will occur.</p>
<p><b>2. A VALID ALARM IS CONFIRMED</b></p> <p>An audible, on-site alarm message begins and continues until the alarm is acknowledged. (If the Mute feature is turned on, there is no on-site message.) <b>Call Delay</b> is activated.</p>	<ul style="list-style-type: none"> <li>• <b>Call Delay</b></li> </ul> <p>This is the programmed waiting period, before the first telephone number is called, to report an alarm.</p>
<p><b>3. DIAL-OUT BEGINS</b></p> <p>Dial-out begins by calling telephone number 1 to report an alarm.</p> <p>If there is no acknowledgment, the Model 400 waits the programmed <b>Intercall Time</b> before dialing subsequent telephone numbers. Dial-out continues in this manner, cycling through the remaining telephone numbers, for the programmed <b>Max Calls</b>.</p>	<ul style="list-style-type: none"> <li>• <b>Intercall Time</b></li> </ul> <p>This is the programmed waiting period, in between sequential dialing of telephone numbers, to report an alarm.</p>

**4. THE ALARM IS  
ACKNOWLEDGED**

When the alarm is acknowledged, the dial-out process is cancelled and the audible, on-site alarm message stops.

**• Max Calls**

This is the total number of telephone calls that will be dialed in response to any valid alarm. Telephone numbers are dialed sequentially, and continue to cycle until the maximum number of calls is reached. If no acknowledgment occurs, then at the completion of Max Calls, all alarms are automatically acknowledged.





## **CHAPTER 4: COMMUNICATIONS PROGRAMMING**

This chapter explains the keypad commands for communications programming of the Model 400, including interrogation and resetting of the following:

- Voice Messages
- The Unit ID Number
- Dial-out Telephone Numbers
- Tone or Pulse Dialing
- Special Dialing with Pagers, Beepers and Access Numbers.
- Dial-out test mode
- Rings Until Answer
- Telephone Answering Device Compatibility
- Listen-in Time
- Call Delay
- Local Voice Mute
- Voice Repetitions
- Intercall Time
- Maximum Number of Calls
- The Clock
- Security Code

### **4.1 VOICE MESSAGES**

The 400's digital speech recording feature allows you to record custom messages for each of the four Zones and an ID Message. This means that when the 400 calls you during an alarm, you will hear a personalized Voice Message identifying the unit and telling you exactly what alarm condition exists. You can record a separate message for each of the four Zones. The message can run a maximum of 5 seconds. The ID Message can be a maximum of 8 seconds. You can shorten the message length by pressing the ENTER key after reciting the message.

The **ID Message** is used to identify the unit. This could be a particular building name, its location (address or city), or some other identifier.

### **To program the ID Message:**

1. Press the SET key.



2. Press the MESSAGE key. The 400 will say "Enter Message Number."



3. Press the ID key (number 0 key).



4. When the unit beeps, begin speaking your message into the microphone. The unit will say "OK," when the recording time has elapsed; then it will play back your recorded message.

### **To play back the ID Message:**

1. Press the WHAT IS key.



2. Press the MESSAGE key.



3. Press the ID key (number 0 key).



The 400 will play back your recorded message.

The Zone Messages are used to identify the device or condition being monitored such as temperature, humidity, equipment alarms, security alarms, etc.

### **To program the Voice Message for a Zone:**

1. Press the SET key.



2. Press the MESSAGE key. The 400 will say, “Enter Message Number.”



3. Press the number key for the corresponding Zone.



4. When the unit beeps, begin speaking your message into the microphone. The unit will say “OK,” when the recording time has elapsed; then it will play back your recorded message.

### To play back the message for a Zone:

1. Press the WHAT IS key.



2. Press the MESSAGE key.



3. Press the corresponding Zone number key.



The 400 will play back your recorded message.

### **To erase a Zone or ID message:**

1. Press the SENSOR ON/OFF key.



2. Press the MESSAGE key.



The 400 will say "Enter message number."

3. Press the Zone Number or ID key.



The 400 will say, "Message erased."

## **4.2 THE UNIT ID NUMBER**

The Unit ID Number is the identification number of the Model 400. This number is typically the telephone number where the unit is installed, or it may be designated using any number that best suits your application.

The purpose of the Unit ID Number is to immediately provide the source of any alarm, especially when using multiple Model 400 units in a complex monitoring system. When the Model 400 is called from a remote location, it always begins its message with the identification number:

"Hello, this is (Unit ID Number)."

### **4.2.1 PROGRAMMING THE ID NUMBER**

#### **To program the ID Number:**

1. Press SET.



2. Press ID NUMBER.



- Using the number keys, enter up to 16 digits for the ID number. The Model 400 will recite the digits as they are pressed.



- Press ENTER. The Model 400 will respond: "Okay."



### 4.2.2 INTERROGATING THE ID NUMBER

To interrogate the ID numbers:

- Press WHAT IS.



- Press ID NUMBER. The Model 400 will recite the Unit ID Number programmed.



### 4.2.3 DELETING THE ID NUMBER

To delete the ID number

- Press SET.



- Press ID NUMBER



- Press ENTER



## 4.3 DIAL-OUT TELEPHONE NUMBERS

The Model 400 can store up to four 48-digit phone numbers. These are the numbers that will be called during alarm dial-out. In the event of an alarm, the numbers are dialed sequentially, 1 through 4. Begin programming the first telephone number by assigning it to the key labeled with the number 1 on the keypad, and continue to assign any other telephone numbers in numerical order. A pause, pound or star can be added to an individual phone number to access different phone and beeper systems. See Special Dialing, Section 4.5.

### 4.3.1 PROGRAMMING DIAL-OUT TELEPHONE NUMBERS

**To program dial-out telephone numbers:**

1. Press SET.



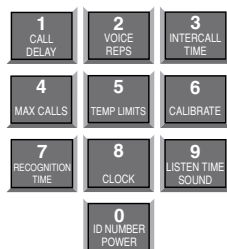
2. Press PHONE NUMBER T/P.



3. Select which telephone number to program. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. The Model 400 will respond: "Enter number."



4. Enter the complete telephone number using the number keys.



5. Press ENTER. The unit will respond with "Okay."



6. Repeat above procedure to program up to four separate telephone numbers.

Model 400 will respond again “Enter number”

### 4.3.2 INTERROGATING A DIAL-OUT TELEPHONE NUMBER

**To interrogate dial-out telephone numbers:**

1. Press WHAT IS.



2. Press PHONE NUMBER.



3. Press a number key (from 1 to 4).



Model 400 will recite the corresponding telephone number. If there is no number programmed for a particular key, the unit will respond: “No number.”

### 4.3.3 ERASING A TELEPHONE NUMBER

**To erase a telephone number:**

1. Press SET.



2. Press PHONE NUMBER.





3. Press the number key (from 1 to 4) representing the telephone number you want to erase.



4. Press ENTER. The Model 400 will say "Number # erased."



## 4.4 DIAL-OUT TEST MODE

The 400 allows you to test your telephone programming by simulating an alarm dialout to any programmed telephone number. This can be a valuable tool for insuring that your programming is correct and also for troubleshooting dialing problems. In this mode all signals on the telephone line are audible through the local speaker.

### 4.4.1 TO TEST A DIALOUT PHONE NUMBER:

1. Press the SET key.



2. Press the TEST key.



The 400 will say "Enter Number."

3. Press a number key (1–4) corresponding to the phone number entry you wish to test, and press ENTER.



The 400 will dial the number and announce the time for voice calls, or send its ID number for pager calls.

### 4.4.2 MANUALLY DIAL A TELEPHONE NUMBER

1. Press the SET key.



2. Press the TEST key.



The 400 will say “Enter number.”

3. Press 0 then ENTER to enter manual dialing mode. The 400 will go off-hook and you should hear a dial tone through the speaker. Press any number keys to dial a telephone number.



4. Press ALARM CANCEL to hang up and exit the test.



## 4.5 TONE OR PULSE DIALING

The Model 400 can dial out in pulse or Touch Tone™. Select the type of dialing, in either pulse or tone, depending upon the type of service provided by your telephone company. The default is tone.

### To program for either pulse or tone:

1. Press the SENSOR ON/OFF key.



2. Press PHONE NUMBER T/P.



The Model 400 will respond: “Tone” to indicate that tone dialing is enabled, or “Pulse” to indicate that pulse dialing is on and enabled.

3. Repeat key sequence to switch between settings.

## 4.6 SPECIAL DIALING

The Model 400 has provisions for special dialing sequences. Special dialing sequences allow:

- Dialing that requires an access number to connect with an outside line.
- Dialing that requires the pound (#) or star (\*).
- Dialing to a beeper or pager.

### 4.6.1 SPECIAL DIALING KEYS

The following designated keys represent special functions when used with PHONE NUMBER entries:

#### 1. Pause



PAUSE represents a two-second pause in dialing. It can be used when an access number is required before dialing to an outside line. (For example, in some cases a “9” or other number, must be dialed first, in order to get a dial tone for an outside line.)

#### 2. Pound (#)



A pound may be required when calling some phone or beeper systems.

#### 3. Star (\*)



A star may be required when calling some phone or beeper systems.

#### 4. Code



The CODE key can be used to perform special functions during the dialing sequence. These include: Pager dialing, Wait for Answer, and Switch to Touch-tones. These functions enable the Sensaphone to send a numeric page, or dial a telephone number + office extension, or combine pulse & touch-tone dialing in the same telephone number. Multiple codes can be used during telephone number programming if required. See section 4.5.4 for special instructions on dialing to a beeper or pager.

### Code 1 Pager

When CODE + 1 is inserted as the first digit of the telephone number, the Model 400 will make a pager call. This means that the unit will expect the call to be answered by a paging service provider, then it will send its ID number (using touch-tones), followed by the digits that identify the zone(s) in alarm. The unit will hang-up after it completes the call. See section 4.5.4 for specific programming examples for dialing a pager.

### Code 2 Wait-For-Answer

You can force your Sensaphone to Wait-For-Answer in the middle of dialing a telephone number. This is useful when calling a telephone extension that is initially answered by an auto-attendant. By inserting the wait-for-answer code you can instruct your Sensaphone to call the main number, then wait for an answer by the auto-attendant, then dial the extension. The Sensaphone will not speak its voice message until the telephone is answered at the extension.

Example:

SET + PHONE NUMBER + any unassigned number key 1-4  
+ telephone number + CODE + 2 + extension number + ENTER

### Code 3 Switch to Touch-tone

This command allows you to change from pulse dialing to touch-tone dialing in the middle of dialing a telephone number. This is useful when your telephone service only supports pulse dialing, but you need to send touch-ones after connecting – such as when dialing a numeric pager or navigating a voice menu.

Example:

In this example a telephone number is dialed, the Sensaphone waits for the call to be answered, then changes to touch-tones to dial an extension.

SET + PHONE NUMBER + any unassigned number key 1-4 +  
telephone number + CODE + 2 + CODE + 3 +  
extension number + ENTER

## 4.6.2 INCORPORATING A PAUSE

**Incorporate PAUSE to access an outside telephone line:**

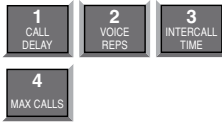
1. Press SET.



2. Press PHONE NUMBER.



3. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. Model 400 will respond: "Enter number."



4. From the number keys, enter the access digit (i.e., 9). The Model 400 will recite the digit.



5. Press PAUSE. The Model 400 will "pause."



- Enter the complete telephone number using the number keys. The Model 400 will recite the digits as they are pressed.



- Press ENTER. The Model 400 will say “Okay.”



### 4.6.3 INCORPORATING A POUND (#) OR STAR (\*)

**Incorporate a pound or star if it is normally included in telephone number:**

- Press SET.



- Press PHONE NUMBER.



- Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. Model 400 will respond: “Enter number.”



- Enter the telephone number using the number keys. The Model 400 will recite the digits as they are pressed.



5. Position the pound (#) or star (\*) within the telephone number where required by pressing the designated keys. The Model 400 will say "pound" or "star" each time the key is pressed.



-OR-



6. Enter any remaining digits of the telephone number.
7. Press ENTER. The Model 400 will say "Enter."



### 4.6.4 SPECIAL DIALING TO A BEEPER OR PAGER

Your Sensaphone can be programmed to send an alarm message to a numeric beeper/pager. The message will include the Sensaphone's telephone number (ID number) and the Zone numbers that are in alarm. For example, if zones 1 and 4 are in alarm, the message on your pager would be: 8882227777-1-4, where 8882227777 is the unit's ID number. A Sound alarm will appear as alarm -9 and a Power alarm will appear as alarm -0. To program a telephone number for Pager dialout, you must enter Code 1 at the beginning of the telephone number. The Sensaphone will say "Code one, Pager" when you enter the command.

Follow the key sequence below to dial a numeric pager:

SET + PHONE NUMBER + any unassigned number key 1-4 +

CODE + 1 + pager telephone number + ENTER

To check your programming:

WHAT IS + PHONE NUMBER + assigned # 1-4

The Sensaphone will say "Pager", followed by the programmed telephone number.

To send a test page:

SET + TEST + assigned # key 1-4 + ENTER

The Sensaphone will let you listen to the dialout sequence through its speaker and send you a message that includes the Sensaphone's telephone number (ID number).

### Voice Prompted Paging Systems

If your paging provider is answered by a voice prompt which requires you to enter one or more touch-tones to send a message, then use the wait-for-answer code (4.5.1) in combination with the Pause key and other number keys to navigate the voice menu until you reach the message entry point. The Sensaphone will automatically send its telephone number, Zone numbers, and a pound (#) tone at the end of the number. For assistance contact Sensaphone Technical Support at 1(877)373-2700.

## 4.7 RINGS UNTIL ANSWER

Rings Until Answer is the programmed number of times the telephone rings before the Model 400 will answer an incoming call. This can be set from 1 to 15 rings. The default value is 4.

### 4.7.1 PROGRAMMING RINGS UNTIL ANSWER

To program Rings Until Answer:

1. Press SET.



2. Press RINGS/TAD. The Model 400 will respond: "Enter number."



3. Using the number keys, enter a value.



4. Press ENTER. The Model 400 will respond: "Okay."





## 4.7.2 INTERROGATING RINGS UNTIL ANSWER

### To interrogate Rings Until Answer:

1. Press WHAT IS.



2. Press RINGS/TAD.



## 4.8 TAD (TELEPHONE ANSWERING DEVICE)

The TAD feature is especially useful because it integrates the operation of the Model 400 with your telephone answering device (e.g. answering machine) in a way that retains the full flexibility of each system. This allows you to have on-demand telephone access to the Model 400, for obtaining a Status Report, or for issuing call-in commands, while your telephone answering device is set to receive outside calls. Programming for use with a telephone answering device (TAD) is always used in conjunction with Rings Until Answer, detailed in section 4.6.

**NOTE:** The TAD feature only applies to answering devices connected to the same telephone line as the Model 400.

### 4.8.1 TAD ENABLE/DISABLE

#### To enable/disable the TAD feature:

1. Press SENSOR ON/OFF.



2. Press RINGS/TAD.



The Model 400 will respond: "TAD On." (If the Model 400 says "TAD Off," repeat steps 1 and 2 to reactivate TAD.)

### 4.8.2 USING THE TAD FEATURE

1. Make sure the TAD feature is enabled on the Model 400. (The default setting is disabled, so you must enable it first.)
2. Determine the number of rings your telephone answering device uses to answer the telephone. (Most answering devices require 4 rings; others are selectable.)
3. On the Model 400, program Rings Until Answer to a greater number than the number of rings set on your answering machine.

**Example:**

Telephone answering device, rings = 4

Model 400, Rings Until Answer = 6

Using the procedure just outlined, all incoming calls will be answered by the telephone answering device, allowing it to operate normally. With the programming just accomplished, the Model 400 can be accessed remotely, by telephone, to obtain the Status Report.

1. Dial the telephone number of the Model 400.
2. Let the telephone ring once and then hang up.
3. Wait approximately ten seconds
4. Call the Model 400 back.

It will answer the telephone on the first ring.

Explanation: The pattern of one ring, followed by a second call (within 30 seconds), signals the Model 400 to answer your incoming call, bypassing the telephone answering device.

**NOTE:** Special Case: If the Model 400 shares the same line with a telephone answering device, and during certain time periods, frequent, incoming calls are expected on that line, then you may want to temporarily disable the TAD feature. If you leave the TAD enabled, it will not adversely affect normal operation, but if two outside telephone calls are received within the same 30-second time window, the Model 400 will interpret this pattern as a signal to answer the telephone. If this occurs, press any key on the Model 400 to hang up.

### 4.8.3 NO TAD IN USE

If a telephone answering device is not used on the same telephone line as the Model 400, make sure that the TAD feature is disabled, or turned off. Only Rings Until Answer programming will determine how incoming calls are answered. For example, if you program Rings Until Answer to 3, incoming calls will be answered in 3 rings.

## 4.9 LISTEN-IN TIME

The Listen-in Time is the amount of time you can listen to sounds from the Model 400's built-in microphone at its installation site. When you call in for a Status Report, the Model 400 announces Listen-in Time at the end of its first round of status readings, saying, "Listen for (programmed time entered)." The programmable range is from 0 to 255 seconds (or up to 4.17 minutes). The default value is 15 seconds.

**NOTE:** The microphone is also used to monitor high sound level. See Chapter 5, Section 5.10 through Section 5.11.1.

### 4.9.1 PROGRAMMING THE LISTEN-IN TIME

#### To program the Listen-in Time:

1. Press SET.



2. Press LISTEN TIME. The Model 400 will respond: "Enter seconds."



3. Using the number keys, enter the seconds. The Model 400 will recite the digits as they are pressed.



4. Press ENTER. The Model 400 will respond: "Okay."



### 4.9.2 INTERROGATING THE LISTEN-IN TIME

**To interrogate the Listen-in Time:**

1. Press WHAT IS.



2. Press LISTEN TIME. The Model 400 will recite the listen-in time.



## 4.10 CALL DELAY

Call Delay is the programmed length of time the Model 400 waits, following detection of an alarm, before it begins the dial-out sequence. This applies only to the first call. (Delay time between calls is also programmable: refer to Intercall Time, Section 4-12.)

The purpose for Call Delay is to allow time for personnel at the Model 400's installation site to respond to and cancel an alarm before dial-out begins. During this time, the Model 400 will audibly repeat its "alarm" message (unless the Local Voice Mute feature has been activated—refer to Section 4.10). The default for Call Delay is 30 seconds. Call Delay can be programmed from 0 seconds to 60 minutes (1 hour).

### 4.10.1 PROGRAMMING THE CALL DELAY

To program the Call Delay:

1. Press SET.



2. Press CALL DELAY.



The Model 400 will respond: "Enter minutes."

- Using the number keys, enter the minutes.



The Model 400 recites the digits as they are pressed.

- Press ENTER. The Model 400 responds: “Enter seconds.”



- Using the number keys, enter the seconds. The Model 400 recites the digits as you press them.

- Press ENTER. The Model 400 responds: “Okay.”



## 4.10.2 INTERROGATING CALL DELAY

### To interrogate Call Delay:

- Press WHAT IS.



- Press CALL DELAY.



The Model 400 will recite the programmed Call Delay.

## 4.1.1 LOCAL VOICE MUTE

When the Model 400 dials out to report an alarm, it also audibly recites the alarm message through its speaker. The Local Voice Mute command allows you to turn off the speaker at the Model 400's site during alarm dialouts and status call-ins. This feature is used to prevent intruders or unauthorized persons from hearing the alarm dial-out message or from hearing the Status Report during an off-site call.

### 4.1.1.1 ENABLE/DISABLE LOCAL VOICE MUTE

**To enable/disable Local Voice Mute:**

1. Press SENSOR ON/OFF.



2. Press MUTE.



The Model 400 will say “Mute On” to indicate that Local Voice Mute is enabled, or “Mute Off” to indicate that it is disabled.

3. Repeat key sequence to switch between enabled or disabled Local Voice Mute.

## 4.1.2 VOICE REPETITIONS

The Voice Repetitions feature allows programming of the number of times the alarm message is repeated per phone call during alarm dial-out.

The maximum repetitions may be set to 10; the default is 3 repetitions.

### 4.1.2.1 PROGRAMMING VOICE REPETITIONS

**To program Voice Repetitions:**

1. Press SET.



2. Press VOICE REPS.



The Model 400 will respond: “Enter number.”

3. Using the number keys, enter a value from 1 to 10.



4. Press ENTER. The Model 400 will respond: "Okay."



## 4.12.2 INTERROGATING VOICE REPETITIONS

To interrogate Voice Repetitions:

1. Press WHAT IS.



2. Press VOICE REPS.



The Model 400 will recite the number programmed.

## 4.13 INTERCALL TIME

The Intercall Time is the programmable period of time the Model 400 waits in calling subsequent telephone numbers. Intercall Time is activated only after alarm dial-out to the first telephone number fails to be acknowledged. This period can be programmed from 10 seconds to 60 minutes. The default intercall time is 1 minute.

If an incoming telephone call is made to the Model 400 during Intercall Time (in between its dialing of subsequent telephone numbers to report an alarm), it will answer the incoming call and immediately report any existing alarms.

### 4.13.1 PROGRAMMING INTERCALL TIME

To program Intercall Time:

1. Press SET.



2. Press INTERCALL TIME.



The Model 400 will respond: “Enter minutes.”

3. Using the number keys, enter the minutes.



The Model 400 recites the digits as you press them.

4. Press ENTER. The Model 400 will respond: “Enter seconds.”



5. Using the number keys, enter the seconds. The Model 400 recites the digits as you press them.



6. Press ENTER. The Model 400 responds: “Okay.”





### 4.13.2 INTERROGATING INTERCALL TIME

To interrogate Intercall Time:

1. Press WHAT IS.



2. Press INTERCALL TIME.



The Model 400 will recite the programmed Intercall Time.

## 4.14 MAXIMUM NUMBER OF CALLS (MAX CALLS)

The Max Calls feature controls the total number of repeated calling attempts by the Model 400 in the event of an alarm. When an alarm occurs, the dial-out process begins, and continues to cycle through your programmed telephone numbers until the alarm is acknowledged or until the maximum number of calls is reached. The Max Calls setting regulates the number of calls that will be made as a result of any alarms; if more than one alarm is detected at once, or if a second alarm occurs during dial-out on the first alarm, the Max Calls setting will start the calling process from zero, until the programmed number of calling attempts are completed.

The default setting for Max Calls is 100, but it may be programmed from 1 to 255 calls. Max Calls is cancelled when an alarm is acknowledged. If the maximum number of calls is completed and no alarm acknowledgement has occurred, the Model 400 will automatically acknowledge any alarm and stop the dial-out.

**NOTE:** If only one telephone number is programmed, the Model 400 will dial out a maximum of 15 times to report an alarm in accordance with FCC rules.

### 4.14.1 PROGRAMMING MAX CALLS

To program Max Calls:

1. Press SET.



2. Press MAX CALLS.



The Model 400 will respond: “Enter number.”

- Using the number keys, enter a value. The Model 400 will recite the digits as you press them.



- Press ENTER. The Model 400 responds: “Okay.”



### 4.14.2 INTERROGATING MAX CALLS

To interrogate Max Calls:

- Press WHAT IS.



- Press MAX CALLS.



The Model 400 will recite the value set for Max Calls.

### 4.15 THE CLOCK

The Model 400 has a built-in clock. The power-up time is 12 am. The clock will keep time from 12 am until you program the current time. It will then keep time from your programmed time. If the AC power fails, the clock will continue to keep time until the battery back-up fails. It will then reset to 12 am when power is restored. An incorrect time is a good indication that the power has failed and the batteries have been expended.

#### 4.15.1 SETTING THE CLOCK

To set the clock:

- Press SET.



2. Press CLOCK.



3. Using the number keys, enter the correct time. The Model 400 will recite the digits as they are pressed.



4. If the time is AM, press the AM key. The Model 400 will say “am” If the time is PM , press the PM key. The Model 400 will say “pm.”



Example: You want to set the clock to 9:45 am. Press the following keys in the order shown:

SET + CLOCK + 9 + 4 + 5 + AM

## 4.15.2 INTERROGATING FOR THE CURRENT TIME

To interrogate the Model 400 for the current time:

1. Press WHAT IS.



2. Press CLOCK. The Model 400 will recite the current time.



## 4.16 THE SECURITY CODE

The Security Code is the last step after setting all other programming parameters for the Model 400. The code consists of a 4-digit number you select and will effectively prevent unauthorized changes to the Model 400's programming. When the Security Code is activated, all keyboard programming is locked. The Model 400 may be interrogated using the WHAT IS key, but the keyboard must be unlocked, via the Security Code, before any programming changes are possible.

### 4.16.1 LOCKING THE KEYPAD

#### To program the Security Code:

1. Press SET.



2. Press CODE.



The Model 400 will say “Enter security code.”

3. Using the number keys, enter 4 digits.



4. Press ENTER.



The Model 400 says, “OK.” The keyboard is now locked.

If unauthorized persons attempt to set a parameter, an error message, “Error 2,” is returned. Whenever any operation except WHAT IS takes place without entering the security code first, this error message occurs.

### 4.16.2 UNLOCKING THE KEYPAD

#### To unlock the keyboard:

1. Press WHAT IS.



2. Press CODE.



The Model 400 will say “Enter Security Code.”

3. Using the number keys, enter the digits for the code.



4. Press ENTER.



If the correct code is entered, the Model 400 will say "OK." If the wrong code is entered, the Model 400 will say "Error 2."

## CHAPTER 5: ALARM PROGRAMMING

This chapter explains the alarm programming and monitoring capabilities of the Model 400, with specific instructions for the following features:

- Configure zones as dry contact or temperature
- Enable/disable zones
- Program alarm Recognition Time for each zone
- Program high and low temperature limits
- Disable alarm response to high or low temperature
- Program temperature in Fahrenheit or Celsius scale
- Calibrate temperature
- Obtain current temperature
- Program AC power-failure Recognition Time
- Enable/disable AC power monitoring
- Program sound level sensitivity
- Program high sound Recognition Time
- Disable alarm response to high sound
- Use Exit Delay via Status Report

### 5.1 ZONE CONFIGURATION

In preparing the Model 400 to sense an alert condition, the zones must be configured as dry contact (either open or closed) or as temperature zones. The default setting for zone 1 is temperature; for zones 2-4, the default is dry contact and open. To configure zone normality, sensors are first wired to the terminal strip at the back of the unit. (Refer to Chapter 2, Section 2.9–2.12, for an explanation on wiring zones.)

The configuration process directs the Model 400 to initialize the 4 zones and establish normal settings. Any change in the status of a zone (for example, from a normally open contact to a suddenly closed contact) is recognized as an alert condition. In the case of a temperature zone, an alert condition is recognized when established temperature limits are exceeded.

**NOTE:** Before starting keyboard commands to configure zone normality on the Model 400, it is very important to check that the sensors you have wired to the unit are set in their normal, non-alarm positions. For example, if a magnetic reed switch (a normally-closed sensor used to detect unauthorized entry) has been wired to the Model 400, make sure that the door or window to be monitored is shut before configuring the zone. If a motion-detector is wired to the unit, it is advisable to block all sources of motion from the sensor before and during configuration.

### 5.1.1 PROGRAMMING ZONE CONFIGURATION

1. Press STANDBY to place the Model 400 in Standby mode.



2. Wire sensors to the zones to the back of the Model 400 (see Chapter 2, Section 2.10).
3. Press RUN. The red light glows when the Model 400 returns to Run mode.



4. Press SET.



5. Press CONFIG.



6. The Model 400 audibly recites the configuration for each of the four zones:
  - If the zone is open, the Model 400 recites the number of the zone and says “normally open.”
  - If the zone is closed, the Model 400 recites the number of the zone, and says “*normally closed*.”
  - If the zone is configured as temperature, the Model 400 recites the number of the zone, followed by “Temperature.”

### 5.1.2 INTERROGATING ZONE CONFIGURATION

1. Press WHAT IS.



2. Press CONFIG.



The Model 400 will audibly recite the configuration of each zone.

## 5.2 ENABLE/DISABLE ZONES

This function allows you to enable or disable a zone's response to an alert condition. An enabled zone will respond to an alert condition and allow dial-out. A disabled zone will cause dial-out to be suppressed, but any existing alert conditions will be revealed during the Status Report. Enable/disable programming is useful during wiring of zones (see Chapter 2) or when a condition needs to be monitored, but is not critical enough to be programmed for dial-out reporting. It is important to verify zone status after performing any task that requires disabling. The default setting for all zones is enabled (ON).

If an alert condition exists when zones are re-enabled, Recognition Time will restart—refer to Section 5.3.

If the sensor is configured as *not used*, the unit will respond “Error the zone is off”. Refer to section 5.13 to designate as used.

### 5.2.1 CHANGING ENABLED/DISABLED ZONE STATUS

1. Press SENSOR ON/OFF.



2. Press the number (1 to 4) of the selected zone to enable/disable. The Model 400 says “Alarm Disabled” to indicate disabled or “Alarm Enabled” to indicate enabled.



### 5.2.2 VERIFYING ENABLED/DISABLED ZONE STATUS

1. Press WHAT IS.



2. Press STATUS.



The Model 400 audibly recites the current status of every zone. In a Status Report, each zone is first identified by its zone number, followed by a report that specifies parameters currently affecting that zone. If a zone is disabled, the word “Alarm Disabled” immediately follows the number recited for that zone.



For example, zone 3 is configured as a normally open, dry contact zone. During the Status Report:

- If disabled, the Model 400 recites:  
“Zone 3, the Alarm is Disabled” for zone 3.
- If enabled, the Model 400 recites:  
“Zone 3—OK,” for zone 3.

In another example, zone 2 is configured as a temperature zone. The current temperature is 76 degrees. During a Status Report:

- If disabled, the Model 400 recites:  
“Zone 2, the alarm is disabled, it is now 76 degrees fahrenheit—OK”
- If enabled, the Model 400 recites:  
“Zone 2—76 degrees fahrenheit—OK.”

### 5.3 ZONE RECOGNITION TIME

The Zone Recognition Time is the length of time an alert condition must be present before a valid alarm exists and dial-out is activated. This time period is programmable, from 0 minutes, 0 seconds (for immediate response) up to a period of 540 minutes, 0 seconds. If an alert condition begins and then clears within the established Recognition Time, no dial-out will occur. When an alert condition continues beyond the programmed Recognition Time, the Model 400 initiates dial-out. The default setting for Zone Recognition Time is 0 minutes, 3 seconds.

#### 5.3.1 PROGRAMMING ZONE RECOGNITION TIME

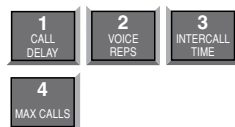
1. Press SET.



2. Press RECOGNITION TIME.



3. Press the number (1 to 4) of the selected zone to be programmed.



The Model 400 responds: “Enter minutes.”

- Using the number keys, enter the minutes. For example, to set a Recognition Time of five minutes, simply press “5” on the keypad. The Model 400 recites the digits as they are pressed.



- Press ENTER. The Model 400 responds: “Enter seconds.”



- Using the number keys, enter the seconds. The Model 400 recites the digits as they are pressed.



- Press ENTER. The Model 400 responds: “Okay.”



## 5.3.2 INTERROGATING ZONE RECOGNITION TIME

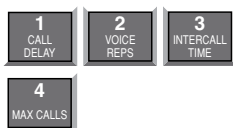
- Press WHAT IS.



- Press RECOGNITION TIME.



3. Press the corresponding zone key (1 to 4).



The Model 400 recites the programmed Recognition Time for that zone.

## 5.4 ESTABLISHING HIGH AND LOW TEMPERATURE LIMITS

High and low temperature limits can be separately programmed for each zone configured as temperature. Limits can range from  $-20^{\circ}$  to  $+150^{\circ}$  Fahrenheit, or from  $-30^{\circ}$  to  $65^{\circ}$  Celsius.

When temperature limits exceed high or low settings, the Model 400 will dial out with an alarm message. Default settings are:  $10^{\circ}$  F for low temperature and  $100^{\circ}$  F for high temperature.

### 5.4.1 PROGRAMMING TEMPERATURE LIMITS FOR A SELECTED ZONE

1. Press SET.



2. Press TEMP LIMITS.



3. From the number keys, press a number (from 1 to 4) that corresponds to the temperature zone being programmed.



The Model 400 responds: "Enter low temperature limit."

- Using the number keys, enter a value for low temperature limit. The Model 400 will recite the digits as they are pressed. If a negative number is required, first press \*, then enter the number.



- Press ENTER.



The Model 400 responds: “Enter high temperature limit.”

- Using the number keys, enter the value for high temperature limit. The Model 400 recites the digits as they are pressed.



- Press ENTER. The Model 400 responds: “Enter.”



**NOTE:** Do not set temperature limits too close to normal room temperature. Minor temperature fluctuations could result in frequent and unnecessary alarm dialouts.

### 5.4.2 DISABLING ALARM RESPONSE TO HIGH OR LOW TEMPERATURE

To disable alarm response to either high or low temperature settings exclusively, enter the following temperature limit when programming the selected zone. (The Model 400 will not respond to temperatures encountered at maximum settings or beyond.) Begin by following the key sequence shown in Section 5.4.1, and when prompted to enter the high or low temperature value:

- Set high temperature to either +150° F or +65° C (high temperature limit) to prevent the Model 400 from responding to a high temperature alarm.
- Set low temperature to either -20° F or -30° C to prevent the Model 400 from responding to a low temperature alarm.

### 5.4.3 INTERROGATING HIGH AND LOW TEMPERATURE LIMITS

1. Press WHAT IS.



2. Press TEMP LIMITS.



3. Press the number key corresponding to the selected temperature zone.



## 5.5 TEMPERATURE SCALE

Temperature zones may be set in either Fahrenheit or Celsius degrees. The default temperature scale is Fahrenheit. To change to Celsius:

1. Press SENSOR ON/OFF.



2. Press °F / °C. The Model 400 responds: “Degrees Celsius” indicating Celsius scale has replaced Fahrenheit scale.



3. To return to Fahrenheit scale, repeat the key sequence. The Model 400 responds: “Degrees Fahrenheit” indicating Fahrenheit scale is in effect.

**NOTE:** When switching from Fahrenheit to Celsius, or vice versa, the change applies to all zones configured to read temperature. When switching temperature scales it is important to reset high and low temperature limits on all temperature zones. Refer to Section 5.4.1 to reset temperature limits.

## 5.6 TEMPERATURE CALIBRATION

To compensate for minor variances in sensor accuracy, an offset may be programmed for each temperature zone. The amount of offset is measured in degrees Fahrenheit or degrees Celsius. Adjustments are possible within a range from -10 degrees to +10 degrees. For example, if zone 3 is sensing temperature and is reading 1 degree too high, then the calibration for zone 3 is set at -1 to obtain an accurate reading.

### 5.6.1 PROGRAMMING TEMPERATURE CALIBRATION

1. Press SET.



2. Press CALIBRATE.



3. Press the number (1 to 4) of the selected temperature zone to be calibrated.



4. Enter the number required to offset the current temperature reading so a correct reading is obtained.

- To program a positive offset number (up to +10 degrees), enter the number on the keypad. The Model 400 recites the digits as they are pressed.
- To program a negative offset number (up to -10 degrees), first press \*. The unit responds with "negative." Next, enter the number on the keypad. The unit recites the digits as they are pressed.



5. Press ENTER. The Model 400 responds: "Okay."



**NOTE:** If you find that your calibration offset exceeds more than + 5 or -5 degrees, other complicating factors could be affecting normal operation of the Model 400. Call Sensaphone for technical assistance.

### 5.6.2 INTERROGATING TEMPERATURE CALIBRATION

1. Press WHAT IS.



2. Press CALIBRATE.



3. Press the number key corresponding to the selected temperature zone.



## 5.7 OBTAINING CURRENT TEMPERATURE

Current temperature readings for each temperature zone may be accessed at any time. The Model 400 recites the zone number, and the actual temperature detected by the attached sensor, for all zones configured as temperature. To obtain current temperature:

1. Press WHAT IS.



2. Press TEST °F/°C.



## 5.8 AC POWER MONITORING ENABLE/DISABLE

The Model 400 monitors AC power failure. This command enables or disables the power failure detection feature. When enabled, the Model 400 will monitor power and dial out when AC power failure exceeds a programmable span of time (refer to AC Power Failure Recognition Time, Section 5.9).

The default setting for AC power monitoring is enabled (on). When disabled, the Model 400 will not dial-out to report power failure.

### 5.8.1 ENABLING/DISABLING THE AC POWER ALARM

1. Press SENSOR ON/OFF.



2. Press POWER.



- The Model 400 will say “Power Alarm Disabled” to indicate that the power alarm is disabled, or
- The Model 400 will say “Power Alarm Enabled” to indicate that the power alarm is enabled.

3. Repeat key sequence to change settings.



## 5.9 AC POWER FAILURE RECOGNITION TIME

The AC Power Failure Recognition Time is the length of time that AC electric power is off before a valid alarm is recognized and dial-out begins. The default setting is 5 minutes, 0 seconds, but is programmable from 0 seconds to a maximum of 540 minutes.

When AC power failure occurs, and throughout the programmed Recognition Time, the Model 400 steadily repeats the message “the power is off” at the unit’s installation site. There is no Call Delay programming available for AC power failure. Immediately following Recognition Time, the Model 400 begins the dial-out process to report power failure.

To cancel the power-failure message locally at the keypad (during or after Recognition Time) press the ALARM CANCEL key on the Model 400 keypad. This action also cancels the dial-out process.

### 5.9.1 PROGRAMMING POWER FAILURE RECOGNITION TIME

1. Press SET.



2. Press RECOGNITION TIME.



3. Press POWER. The Model 400 responds: “Enter minutes.”



4. Using the number keys, enter the number of minutes. The Model 400 will recite the digits as they are pressed.



5. Press ENTER. The Model 400 responds: “Enter seconds.”



- Using the number keys, enter the number of seconds. The Model 400 will recite the digits as they are pressed.



- Press ENTER. The Model 400 responds: "OK."



### 5.9.2 INTERROGATING POWER FAILURE RECOGNITION TIME

- Press WHAT IS.



- Press RECOGNITION TIME.



- Press POWER.



The Model 400 will recite the power Recognition Time.

## 5.10 SOUND ALARM MONITORING

This feature allows you to program the level and duration of sound that will cause the Model 400 to respond to an alarm and dial-out. It may be useful to desensitize the Model 400 to sound if it is installed in an area with a relatively high noise level, or where a loud noise occurs frequently but is not associated with an alarm. In some applications, it may be desirable to increase sound sensitivity to low sound levels.

### 5.10.1 PROGRAMMING SOUND ALARM SENSITIVITY

The sensitivity setting for sound alarm monitoring ranges from 1 to 160. A value of 1 makes the microphone the MOST sensitive to changes in sound. The value 160 makes the microphone the LEAST sensitive to sound. The default value is 32.

1. Press SET.



2. Press CALIBRATE.



3. Press SOUND. The Model 400 responds: "Enter number."



4. Using the number keys, enter a value for sound sensitivity.



The Model 400 recites the digits as you press them.

5. Press ENTER. The Model 400 responds: "Okay."



## 5.10.2 INTERROGATING SOUND SENSITIVITY

1. Press WHAT IS.



2. Press CALIBRATE.



3. Press SOUND. The Model 400 recites the programmed sound sensitivity level.



## 5.10.3 PROGRAMMING HIGH SOUND ALARM RECOGNITION TIME

The Recognition Time for sound alarm monitoring ranges from 5 seconds to 60 seconds. The default value is 8 seconds.

1. Press SET.



2. Press RECOGNITION TIME.



3. Press SOUND. The Model 400 responds: “Enter seconds.”



4. Using the number keys, enter the number of seconds. The Model 400 will recite the digits as they are pressed.



5. Press ENTER.



### **5.10.4 INTERROGATING HIGH SOUND ALARM RECOGNITION TIME**

The Recognition Time for sound alarm monitoring ranges from 5 seconds to 60 seconds. The default value is 8 seconds.

1. Press WHAT IS.



2. Press RECOGNITION TIME.



3. Press SOUND. The Model 400 will recite the Sound Recognition Time.



## **5.1.1 HIGH SOUND ALARM ENABLE/DISABLE**

The Model 400 monitors sound through the built-in microphone. When the sound level suddenly exceeds the programmed high sound limit, the Model 400 will respond with an alert condition. The increased sound level must continue throughout the programmed recognition time. The default for high sound alarm is enabled (on).

**NOTE:** The microphone is also used for listening to on-site sounds. Refer to Chapter 4, Section 4.8. Disabling the sound alarm does not affect listen-in capability.

### **5.1.1.1 CHANGING ENABLED/DISABLED HIGH SOUND ALARM**

1. Press SENSOR ON/OFF.



2. Press SOUND. The Model 400 will say "Sound Alarm Disabled" to indicate disabled or "Sound Alarm Enabled" to indicate enabled.



3. Repeat key sequence to change settings.

## 5.12 EXIT DELAY

When tripping an alarm is unavoidable, yet a true alert condition has not actually occurred, the alarm response, including dial-out, can be temporarily suppressed.

The Model 400 is able to suppress and then reset its dial-out function automatically through use of the Status Report. This is especially convenient when an alert condition is created upon exiting a monitored door, and there is no way to cancel from the local keypad.

**Example:** You are planning to exit through a monitored door. Prior to exiting, you initiate a Status Report recitation at the Model 400 keypad by pressing WHAT IS, followed by STATUS, (key sequence shown below). This allows you approximately 40 seconds to exit without activating the Model 400's programmed response to an alarm. At the conclusion of the status report, normal alarm response is reactivated.

To use exit delay, initiate the Status Report.

1. Press WHAT IS.



2. Press STATUS. The Model 400 recites the full Status Report; during this time, you are able to exit the monitored area without tripping an alarm.



## 5.13 DESIGNATING A ZONE AS UNUSED

This feature allows you to mark selected Zones, Power, or Sound as unused, which will prohibit them from going into alarm and will also leave them out of the status report. Note that programming for the selected Zone will be preserved when the Zone is marked as “unused” and will not be reconfigured if automatic Zone configuration is activated.

To designate a Zone as unused:

1. Press the SENSOR ON/OFF key.

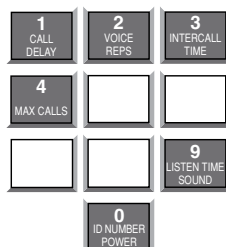


2. Press the SET key.



The 400 will say “Enter Zone Number.”

3. Press the corresponding number of the Zone you wish to mark as unused.



The 400 will respond by saying Zone 1–4, Power, or Sound “Off/On.” Repeat the key sequence to place the Zone back in use.

## **CHAPTER 6: ACKNOWLEDGMENT, STATUS REPORT & REMOTE ACCESS**

In addition to communication and alarm monitoring capabilities, the Model 400 will also respond to your instructions and provide you with access to information on monitored conditions at all times.

By issuing commands to the unit, either at the installation site or over standard telephone lines, the following features may be activated:

- Acknowledgment of existing alarms
- The Status Report on all monitored conditions.
- Limited programming.

### **6.1 ALARM ACKNOWLEDGMENT**

When the Model 400 dials out with an alarm message, it will request acknowledgment before hanging up. Acknowledgment indicates to the unit that the alarm message has been received. Upon acknowledgment, the Model 400 will cancel the dial-out sequence.

There are three ways\* that an alarm is acknowledged directly:

- Local Acknowledgment
- Touch-Tone™ Acknowledgment
- Callback Acknowledgment

\* A fourth method of alarm acknowledgment is indirect. Refer to Max Calls, Chapter 4, Section 4.13 for an example of automatic alarm acknowledgment.

#### **6.1.1 LOCAL ACKNOWLEDGMENT**

To acknowledge an alarm locally (directly at the installation site of the Model 400), press the ALARM CANCEL Key.

#### **6.1.2 TOUCH-TONE™ ACKNOWLEDGMENT**

This method of remote alarm acknowledgment works with a Touch-Tone™ telephone.

**Example:** You receive a call from the Model 400, reporting that an alarm exists. The message concludes: “*Enter Acknowledgement code.*” Now, or at any time during this call, you may acknowledge the alarm with the code “555” if you are using a Touch-Tone™ telephone.



- To enter “555,” press the number (5) key on the Touch-Tone™ phone keypad three times. The Model 400 will respond: “**Alarm Acknowledged.**” The Model 400 will hang up and the dial-out sequence, including any further response to the alarm, will be cancelled.
- If you enter the wrong code or do not enter it within 10 seconds following the conclusion of the message, the Model 400 will respond: “**Error, Enter Acknowledgement code.**” If you do not enter the acknowledgement a second time the unit will say “error” then “goodbye” and hang up. The alarm is still not acknowledged until you call back. You have a period equal to the programmed Intercall Time to call the unit back and enter the “555” acknowledgment code. If you are calling from a pulse or rotary telephone, refer to Callback Acknowledgment, Section 6.1.3, below.

## 6.1.3 CALLBACK ACKNOWLEDGMENT

Callback Acknowledgement is a feature that allows you to acknowledge an alarm without entering Touch-Tones™. This feature is disabled by default and must be enabled by entering the key sequence below. When Callback Acknowledgment is enabled, simply call the unit back and allow the line to ring 10 times. The unit will then answer the call, announce the alarm, then say “Alarm Acknowledged.” This indicates that the alarm has been acknowledged.

To enable or disable Callback Acknowledgement:

1. Press SENSOR ON/OFF.



2. Press STATUS.



The Model 400 will say “*Callback Acknowledgement Enabled*” to indicate that Callback Acknowledgment is Enabled, or “*Callback Acknowledgement Disabled*” to indicate that Callback Acknowledgement is Disabled. This method of remote alarm acknowledgment works with any telephone: pulse, rotary, or Touch-Tone™.

**Example:** The Model 400 calls you with an alarm message. You answer the call with a rotary or pulse telephone, and do the following:

- You listen to the message and hang up.
- Then you call the Model 400 back on any telephone. You must wait for 10 rings—this signals the Model 400 to answer your telephone call. (Make

sure to call back within the programmed setting for Intercall Time—refer to Chapter 4, Section 4.12.)

When the Model 400 answers your return call, it announces the alarm. Then it says: “*Alarm Acknowledged.*” This indicates that the alarm has been acknowledged.

**NOTE:** If you have the TAD feature ( telephone answering device) enabled, call the unit and let the phone ring once, then hang up. Wait a few seconds then call the unit back a second time. The model 400 will now answer on the first ring. If TAD is disabled, the telephone must be allowed to ring 10 times. This serves as a precaution against a random alarm acknowledgment. Refer to Chapter 4, Section 4.7, for complete information on using the TAD feature.

## 6.2 STATUS REPORT

The Status Report allows access to complete information on all monitored conditions either locally, from the keypad, or by telephone, from any location. The Model 400 will answer an incoming telephone call following the programmed Rings Until Answer (refer to Chapter 4, Section 4.6). Included with the Status Report are messages related to alarm conditions, AC power, battery backup and sound level. It also provides an opportunity for listening to on-site sounds (refer to Listen-in Time, Chapter 4, Section 4.8).

To initiate the Status Report:

1. Press WHAT IS.



2. Press STATUS.



Sections 6.2.1, 6.2.2, and 6.2.3 demonstrate two different Status Report recitations. The Status Report starts with:

*“Hello. This is 555-1234 (or the programmed ID), (Custom ID Message).”*

*“It is now 12:15pm (or the current time).”*

The Model 400 proceeds with a separate report for each zone. Each zone identifies itself by reciting the zone number and it's associated voice message.

### 6.2.1 EXAMPLE: STATUS REPORT, NO ALARMS

Zones 2, 3, and 4 are configured as dry contact and zone 1 is configured as temperature. No alarms exist. The Status Report begins by saying, *"Hello, this is 555-1234, this is building M, third floor; it is now 2:30 pm."*

Following this introduction, the report continues:

*"Zone 1, room temperature, 74 degrees, OK."*

*"Zone 2, door alarm, OK."*

*"Zone 3, ups alarm, OK."*

*"Zone 4, water sensor, OK."*

*"The sound is OK."*

*"The power is ON."* This refers to AC power.

*"The batteries are OK."* Other possible responses: *"Batteries are low"* or *"Replace batteries."* (Refer to Section 6.2.4 for additional information regarding battery condition.)

*"The output is off."*

*"Listen to the sound for 10 seconds."* In this case, the programmed Listen-in Time is set at 10 seconds. (This feature is not available when obtaining the Status Report on-site, directly at the keypad.)

The Status Report repeats once more and the Model 400 concludes the call, saying: *"Goodbye."* (The Status Report will not repeat if obtained at the keypad; *"Goodbye,"* is also not recited.)

The phrase *"no number"* at the end of a Status Report indicates that no dial-out phone numbers have been programmed.

### 6.2.2 EXAMPLE: STATUS REPORT, EXISTING ALARMS

Zones 2, 3, and 4 are configured as dry contact and zone 1 is configured as temperature. An emergency situation is at hand: a fire in a greenhouse has tripped a smoke alarm and electrical power has been disrupted. In addition to high sound and AC power alarms, separate alarms exist on zones 1, 2, 3, and 4. You happen to call in for the Status Report, which begins with, *"Hello, this is 555-1234; 'this is the Sensaphone 400 at ACME Greenhouse, 225 Oak Street'"*

*It is now 8:45 PM*

*Zone 1, "Temperature in greenhouse", 110 degrees Fahrenheit, too high, acknowledged alarm exists*

*Zone 2, "Door alarm in greenhouse", not OK, acknowledged alarm exists*

*Zone 3 “Water pressure alarm in greenhouse”, not OK, acknowledged alarm exists*

*Zone 4 “Greenhouse control system”, not OK, acknowledged alarm exists*

*A High Sound alarm exists, it is now too high*

*The Power is Off.*

*The Batteries are Low.*

*The Output is Off.*

*Listen to the sound for 10 seconds.*

*Goodbye.*

### **6.2.3 EXAMPLE: STATUS REPORT, DISABLED ZONES**

If a zone is disabled, the dial-out feature for that zone is deactivated, but all other programmed parameters remain in effect. In the example below, all 4 zones are disabled, although zones 1 and 3 are detecting alarms. AC power and Sound Level are also disabled for dial-out. When you call the Model 400 for a Status Report, you hear the following:

*Hello, this is 555-1234; “this is the Sensaphone 400 at ACME Greenhouse, 225 Oak Street”*

*It is now 8:45 PM*

*Zone 1, “Temperature in greenhouse”, the alarm is disabled, it is now 110 degrees Fahrenheit, too high, acknowledged alarm exists*

*Zone 2, “Door alarm in greenhouse”, the alarm is disabled, it is not OK.*

*Zone 3 “Water pressure alarm in greenhouse”, the alarm is disabled, it is not OK.*

*Zone 4 “Greenhouse control system”, the alarm is disabled, it is not OK.*

*The Sound alarm is disabled, it is now too high*

*The Power alarm is disabled, it is now Off.*

*The Batteries are Low.*

*The Output is On.*

*Listen to the sound for 10 seconds.*

*Goodbye.*

The Status Report repeats once more and the Model 400 concludes the call, saying: “Goodbye.”

## 6.2.4 BATTERY CONDITION

During a Status Report, you may hear one of three possible messages regarding battery power. The Model 400 determines the appropriate message by measuring battery voltage. Depending upon the remaining voltage, it may respond:

- “The batteries are OK,” if over 8.2 Volts.
- “The batteries are low,” if between 7.2 and 8.2 Volts.
- “Replace batteries,” if below 7.2 Volts.

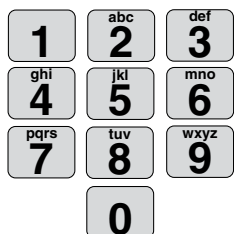
## 6.2.5 REMOTE ACCESS BY TOUCH-TONE™ TELEPHONE

You can issue a number of commands to the 400 remotely using a Touch-Tone™ telephone. This command mode can be entered at any time during the status report. Simply press a Touch-Tone™ and the unit will halt the report and respond with “OK.” You are now in Touch-Tone™ command mode. Commands are available to perform the following functions:

- Enable and disable zones, power monitoring, and sound monitoring
- Recite/Set High and Low alarm limits
- Recite/Set telephone numbers
- Record/Play custom voice messages
- Recite/Set the relay output
- Activate the microphone for listen-in
- Recite status report

**Note:** If a security code is enabled, the 400 will prompt you with “Enter security code.” Enter the four-digit keypad security code plus “#” to enter touch-tone command mode. If entered correctly, the 400 will respond with “OK” and you can proceed to enter the commands. If entered incorrectly, the unit will give you one more chance. If it is incorrect a second time, the unit will say “Error, goodbye” and hang up.

The commands are put together based on the letters of a touch-tone telephone. See typical telephone keypad layout below.



Many of the commands use three letters that represent an abbreviation of the selected command. For example, to Set a High limit on Zone 1 you would press S + H + 1 (or in numeric form 7 + 4 + 1)

The tables below list all of the touch-tone commands that are supported. Commands are listed in both character and numeric formats. The # key is used as an ENTER key. Use the \* key to represent a negative sign or to represent the [CODE] key when programming telephone numbers.

### Enable/Disable Zones

This command will toggle the selected zone between the enabled or disabled state.

<u>Description</u>	<u>Touch-Tone Command</u>
Enable/Disable Zone	* + Z(9) + (zone number)

### Set and Recite High & Low Alarm Limits

The following commands are used to set or recite the Low Alarm Limit for any Zone.

<u>Description</u>	<u>Touch-Tone Command</u>
Set Zone Low Limit	S(7) + L(5) + (zone #) + (value) + #
Description	Touch-Tone Command
What Is Zone Low Limit	W(9) + L(5) + (zone #)

The following commands are used to set or recite the High Alarm Limit for any Zone.

<u>Description</u>	<u>Touch-Tone Command</u>
Set Zone High Limit	S(7) + H(4) + (zone #) + (value)+ #
Description	Touch-Tone Command
What Is Zone High Limit	W(9) + H(4) + (zone #)

### Set and Recite Telephone Numbers

The following commands will allow you to program and recite dialout telephone numbers. You may need to use the Special Dialing Codes below.

#### Special Dialing Codes Summary

Code 1: Numeric pager type

Code 2: Wait for answer

Code 3: Change to Touch-Tone

Code 4: Pause

Code 5: Star (\*)

Code 6: Pound (#)

<u>Description</u>	<u>Touch-Tone Command</u>
Setting a phone number ber) + #	S(7) + T(8) + (entry 1–4) + (telephone num-

<u>Description</u>	<u>Touch-Tone Command</u>
Reciting a phone number	W(9) + T(8) + (entry 1–4)

## Record and Play Custom Voice Messages

The following commands will allow you to record and play back custom voice messages for the ID message (0) and each zone (1–4).

<u>Description</u>	<u>Touch-Tone Command</u>
Record a Message	S(7) + M(6) + (entry 0–4)

<u>Description</u>	<u>Touch-Tone Command</u>
Play a Message	W(9) + M(6) + (entry 0–4)

## Control the Relay Output

The following commands will allow you to check the status of the relay output and to toggle the Relay Output On and Off.

<u>Description</u>	<u>Touch-Tone Command</u>
Reciting the Output Status	W(9) + R(7) + O(6)

<u>Description</u>	<u>Touch-Tone Command</u>
Switching the Output	S(7) + R(7) + O(6)

## Activate Microphone Listen-in

The following command will allow you to activate the microphone listen-in for the programmed duration.

<u>Description</u>	<u>Touch-Tone Command</u>
Activate Mic Listen-in	M(6) + I(4) + C(2)

### **Request Status Report**

The following command will initiate a status report.

<u>Description</u>	<u>Touch-Tone Command</u>
Recite status report	W(9) + S(7) + R(7)

### **Hang-up**

The following command will make the 400 hang up the telephone line.

<u>Description</u>	<u>Touch-Tone Command</u>
Hang-up the phone line	B(2) + Y(9) + E(3)





## **CHAPTER 7: OPERATION**

After installation and programming is completed, the Model 400 is fully operational. This chapter explains the sequence of events that occur during an alarm dialout to illustrate how the Model 400 operates.

### **7.1 ALARM DETECTION, DIAL-OUT AND ACKNOWLEDGMENT**

Generally, an alarm event is structured in the following manner:

- I. The Model 400 detects an alert condition due to a change at the sensor.
- II. A valid alarm is recognized.
- III. Dial-out begins.
- IV. The alarm is acknowledged.

Often, an alarm does not proceed through all stages: either an alert condition does not persist long enough to be considered valid, or a valid alarm is cancelled.

The table on the following pages explains the alarm detection, dial-out and acknowledgment features and lists important variable factors affecting their operation.

I. Model 400 Detects a Change at the Sensor	Variable Factors
<p>Model 400 detects a change in the monitored condition (from the sensor wired to one of the zones). This is considered an alert condition, and does not qualify as a valid alarm at this point.</p> <p>The condition continues throughout the programmed Recognition Time. If the condition (or sensor) reverts to its normal state before the Recognition Time is reached, no alarm will occur.</p>	<p><i>Zone Type: (1) An open circuit closes, (2) a closed circuit opens, or (3) temperature limits are exceeded.</i></p> <p><i>Recognition Time: Activated</i></p>
II. A Valid Alarm is Recognized	Variable Factors
<p>The condition must persist long enough to meet or exceed the programmed Recognition Time. When Recognition Time has expired, but the alert condition continues, the Model 400 will determine that a valid alarm exists.</p> <p>When a valid alarm is determined, Call Delay is activated, forcing the Model 400 to wait for a programmed period of time before starting the dial-out process. Call Delay applies to the period just prior to dial-out, before the first telephone call is made.</p> <p>Call Delay provides the opportunity to cancel a valid alarm at the Model 400's installation site, before dial-out occurs. An audible voice message indicates which of the zones is in alarm. If on-site personnel acknowledge the alarm within the Call Delay time, the Model 400 will not dial out. (Local Voice Mute is disabled, so that alarm messages can be heard at the site.)</p>	<p><i>Recognition Time: Expired</i></p> <p><i>Valid Alarm: Exists</i></p> <p><i>Call Delay: Activated</i></p> <p><i>Alarm Message: Audible, On-site Activated</i></p> <p><i>Local Voice Mute: Disabled</i></p>

III. Dial Out Begins	Variable Factors
<p>The dial-out process is activated as soon as the Call Delay time expires (if the alarm has not been cancelled at the Model 400's installation site.) The dial-out begins with telephone number 1 and proceeds sequentially, through the remaining telephone numbers.</p>	<p><i>Call Delay: Expired</i></p>
<p>If the alarm is not acknowledged with the first dial-out telephone call, the Model 400 waits the duration of Intercall Time before dialing the next telephone number. Intercall Time is the programmed waiting period in between each dial-out telephone call.</p>	<p><i>Intercall Time: Activated</i></p>
<p>When the telephone is answered, the programmed Voice Repetitions determine the number of times per call the Model 400 recites the alarm message.</p>	<p><i>Voice Repetitions: Activated</i></p>
<p>Call Progress, an automatic feature, enables the Model 400 to detect whether or not the telephone call is answered. After 10 rings, or if a busy signal is encountered, the Model 400 will hang up, wait the programmed Intercall Time, and proceed to dial the next telephone number.</p>	<p><i>Call Progress: Activated</i></p>
<p>If no telephone calls are answered, the Model 400 dials out sequentially, through the remaining telephone numbers and continues to cycle until the programmed Maximum Number of Calls is reached.</p>	<p><i>Max Calls: Activated</i></p>
<p>When the telephone is answered, the Model 400 will immediately begin reciting a message that indicates which of the zones is in alarm. At the same time, the alarm message is repeating at the Model 400's installation site. The Model 400 will request acknowledgment, if it has not yet occurred.</p>	<p><i>Alarm Messages: By Telephone and On site</i></p>

IV. The Alarm Is Acknowledged	Variable Factors
<p>At any time after a valid alarm is determined, the alarm may be acknowledged at the Model 400's installation site, by pressing ALARM CANCEL key.</p> <p>When the Model 400 dials out and the call is answered via Touch-Tone telephone, any alarm may be instantly acknowledged by pressing "555."</p> <p>If the alarm message repeats for the number of programmed Voice Repetitions, and "555" has not been entered, the Model 400 will say:</p> <p><i>"Enter acknowledgement code."</i></p> <p>The Model 400 waits 10 seconds for the Touch-Tone code "555" to be entered. If the code is entered within 10 seconds, it responds:</p> <p><i>"Alarm acknowledged."</i></p> <p>The alarm is considered acknowledged and the dialout concludes.</p> <p>If the Model 400 does not receive the Touch-Tone code within 10 seconds, it recites the following:</p> <p><i>"Error, enter acknowledgement code."</i></p> <p>If the Model 400 does not receive the acknowledgement code a second time, it says "error, goodbye" and hangs up. The recipient of this message must call the Model 400 back within the period programmed for Intercall Time, in order to acknowledge the alarm. If Local Voice Mute is off, the unit will beep at the installation site while waiting for this call.</p> <p>Callback Acknowledgement: If enabled, the Model 400 waits 10 rings before answering to guard against random acknowledgment. If an answering device is connected to the same line as the Model 400 (and TAD is enabled), you must call the unit and let the line ring once, then hang up, wait ten seconds and call back again within 30 seconds. The Model 400 will answer on the first ring. It will recite any unacknowledged alarms, then say:</p> <p><i>"Alarm acknowledged, goodbye."</i></p>	<p><i>Local, On-site Acknowledgment</i></p> <p><i>Touch-Tone Acknowledgment: Fast Code 555</i></p> <p><i>Touch-Tone Acknowledgment: Normal Code 555</i></p> <p><i>Tone or Pulse Callback Acknowledgment: Within Intercall Time</i></p>

	Variable Factors
When the Model 400 hangs up, the alarm is acknowledged and dial-out stops.	<i>Tone or Pulse</i>
If calls remain unanswered, or if they are received by an answering machine or FAX, the Model 400 continues the dialout sequence; it waits the Intercall Time and proceeds to dial the next telephone number. Telephone numbers are dialed sequentially, and this cycle continues for the number of Max Calls programmed. If no acknowledgment occurs, then at the completion of Max Calls, the alarm is automatically acknowledged and the dial-out process is terminated.	<i>Callback</i> <i>Acknowledgment:</i> <i>TAD Enabled</i>         <i>Max Calls</i> <i>Acknowledgment</i>

**NOTE:** Acknowledging the alarm does not correct the situation! The alarm condition will still exist until the sensor is restored to its normal state.

## 7.2 EXAMPLE: A DIAL-OUT TELEPHONE CALL

The following parameters are selected for demonstration purposes:

- Model 400 Unit ID Number is set to 555-5674. It is currently installed at your place of business.
- Dial-out Telephone Number 1 is programmed to 555-1234, your home telephone number.
- Voice Repetitions are set to 4.

The Model 400 is detecting an alarm on zone 2.

The telephone rings at 555-1234, your home number.

You answer the telephone and hear the following message:

*“Hello, this is 555-5674. This is the Sensaphone 400 at John’s Printing Express. It is now 12:30 Am. Zone two, back door security sensor, alarm exists, it is not okay.”*

(4-seconds to hear on-site sound from unit's microphone.)

*“Hello, this is 555-5674. This is the Sensaphone 400 at John’s Printing Express. It is now 12:30 Am. Zone two, back door security sensor, alarm exists, it is not okay.”*

(4-seconds to hear on-site sound from unit's microphone.)

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*"Hello, this is 555-5674. This is the Sensaphone 400 at John's Printing Express. It is now 12:30 Am. Zone two, back door security sensor, alarm exists, it is not okay."*

(4-seconds to hear on-site sound from unit's microphone.)

*"Hello, this is 555-5674. This is the Sensaphone 400 at John's Printing Express. It is now 12:30 Am. Zone two, back door security sensor, alarm exists, it is not okay."*

(4-seconds to hear on-site sound from unit's microphone.)

*"Enter acknowledgement code."*

**NOTE:** It is important that your dial-out telephone numbers be answered by you or other authorized personnel in order to ensure adequate response to an alarm.

## CHAPTER 8: CONTROLLING THE OUTPUT

The Sensaphone 400 includes a relay output that can be used to control a light, siren, or other device. The output is a Form-C Normally Open/Normally Closed mechanical relay and is rated for up to 30VAC/VDC 1A. A sample wiring diagram is shown below:

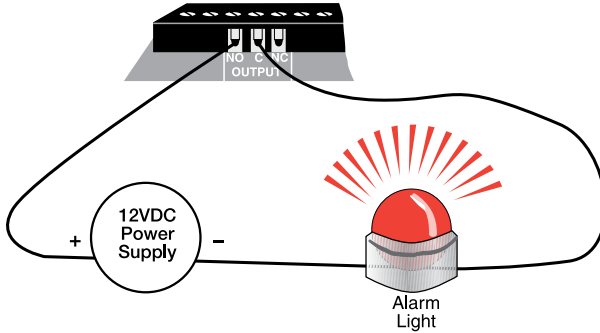


Figure 1: Relay output connected to alarm

The output can be programmed to operate in one of 9 automatic modes or it can operate in manual mode (default). The 9 automatic modes allow the output to automatically turn on and off based on individual alarms or any alarm. In manual mode the output is controlled via keypad command or remotely via touch-tone phone. A description of each mode is described below.

### 8.1 OUTPUT MODES

Mode	Description
1	Output on when zone 1 goes into alarm. Off when alarm is acknowledged.
2	Output on when zone 2 goes into alarm. Off when alarm is acknowledged
3	Output on when zone 3 goes into alarm. Off when alarm is acknowledged.
4	Output on when zone 4 goes into alarm. Off when alarm is acknowledged.
9	Output on when a Sound alarm occurs. Off when alarm is acknowledged.
0	Output on when a Power alarm occurs. Off when alarm is acknowledged.



Mode Description	
Phone	Output on when phone line is unplugged for more than 15 seconds. Off when a phone line is plugged in.
•	Output on when any alarm occurs. Off when all alarms are acknowledged.
#	Output controlled manually via keypad command or touch-tone.
CODE	Output on when any alarm occurs, except for when a phone line is unplugged. Off when all alarms are acknowledged.

8.1.1 TO PROGRAM THE OUTPUT MODE:

1. Press the SET key.



2. Press the OUTPUT key.



The 400 will say “Enter output mode.”

3. Using the number keys, enter a value for the output mode.



4. Press the ENTER key.



The 400 will say “OK” and recite a description of the mode selected, such as “Automatic on Zone 1” or “Manual.” Note that when Mode \* is selected, the 400 will simply say “Automatic on Alarm,” meaning that the output will automatically turn on when any alarm occurs.

### 8.1.2 TO PLAY BACK THE PROGRAMMED OUTPUT MODE:

1. Press WHAT IS.



2. Press OUTPUT.



The 400 will recite the programmed output mode.

## 8.2 SWITCHING THE OUTPUT USING THE KEYPAD

When programmed for Manual mode, the command to switch the output is:

SENSOR ON/OFF + OUTPUT.



The 400 will respond “The output is on/off” to indicate the state of the output.

**Note:** If the 400 says “Error,” the output is not programmed for manual mode.

### 8.2.1 SWITCHING THE OUTPUT OVER THE PHONE

The following commands will allow you to check the status of the relay output and to toggle the Relay Output On and Off.

To recite the Output Status press W(9) + R(7) + O(6)



To switch the Output press S(7) + R(7) + O(6)



## 8.3 TYPICAL APPLICATIONS

### Heating Up Your Cottage Or Cabin Remotely

If you keep your cottage or cabin open all year around, or if you do not drain your pipes and add antifreeze to your plumbing, you likely keep your furnace active when you are away but at a very low temperature. The Sensaphone will provide an invaluable service to you by keeping you updated to any change in the status of your furnace operation. Prior to your arrival at your cottage or cabin, you can remotely use your Sensaphone 400 to raise the thermostat and increase the heat.

Most furnaces use a typical 4-wire (heat/cooling) or 3-wire (heat only) thermostat. The Sensaphone can easily control these types of thermostats. **If your heating source consists of high voltage electric baseboard heaters, you should consult a qualified electrician or heating professional for proper installation of the Sensaphone remote control facility.** Electric baseboard heaters may utilize either a low voltage (2-wire) thermostat or a direct control high voltage thermostat. Only the low voltage thermostat may be directly connected to the Sensaphone.

#### 8.3.1 SINGLE THERMOSTAT CONTROL

There are two installation methods that can be used to remotely change the thermostat setting in your cottage or cabin; the single thermostat method and the dual thermostat method (see section 8.3.2 for details on the dual thermostat method). The single thermostat method requires you to install a model with an input to switch between two temperature settings. Sensaphone offers a 7-day programmable thermostat and power supply which has this feature (order part #'s FGD-0064 & XFR-0024). This thermostat has been carefully chosen to work with the model 400 to allow remote control between normal or vacation mode. You will need to replace your current thermostat, so if you are unsure about performing this work yourself, please contact a licensed heating/cooling professional for installation assistance. Follow the manufacturer's instructions for installing the thermostat.

The Model 400 will need to be wired to the thermostat to control it. For a visually appealing installation you may want to locate the Sensaphone close to your heater so that the cable follows the same path as the one from your heater to the thermostat. An added benefit of this location is that you can easily add a water sensor to monitor for leaks around your hot water heater or other plumbing. Typically the water heater is located near the heating and cooling system.

#### Step 1: Install the thermostat.

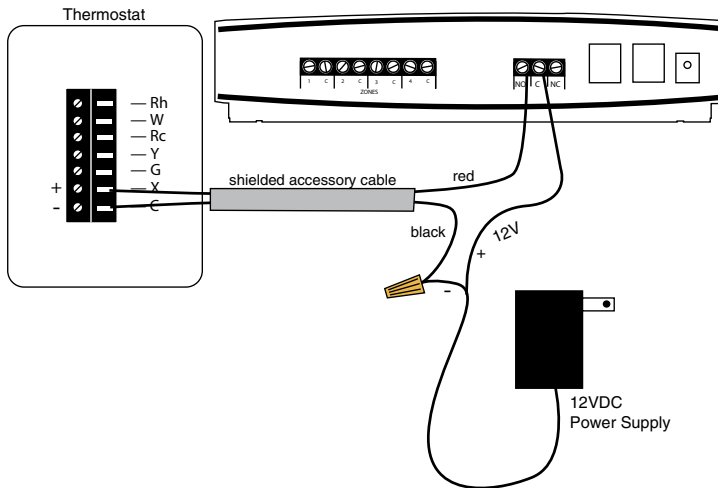
Refer to the manufacturer's instructions for installation. For installation assistance, contact Aube Technologies at 1-800-831-AUBE.

**Step 2: Mount the Sensaphone 400.**

Choose a location for your Sensaphone that allows for easy wiring to the thermostat, such as near your heater/air conditioning system. Mount the unit on a wall or flat on a desktop or table surface. Plug in the power supply and connect the telephone line.

**Step 3: Connect cable from thermostat to Sensaphone 400.**

This Sensaphone 400 has a terminal strip below the input/output wiring door that will connect to the 12VDC power supply and X & C terminals of the thermostat (See Figure 1). This connection is required to switch the thermostat between normal and vacation modes. Run a two-conductor cable from the thermostat to the Model 400. On the thermostat, connect the red wire to the X (+) terminal, and the black wire to the C (-) terminal. On the 400, connect the red wire to the NO terminal. Connect the black wire to the negative wire from the power supply. Use a wire nut to complete this connection. Connect the positive wire from the power supply to the "C" terminal on the model 400.


**Step 4: Program the Thermostat.**



Refer to the manufacturers instructions for programming the thermostat. Be sure to program settings for both normal and vacation modes.

**Controlling the Thermostat**

The operating mode of the thermostat (normal/vacation) can be controlled at the Model 400 keypad or remotely via Touch-Tone comands. Both methods are described below:


### Keypad commands:



1) To enable Vacation Mode, press the [SENSOR ON/OFF] key, then the [OUTPUT] key. The unit will respond by saying "ON" to indicate that Vacation Mode is set. The Suitcase icon  will appear and blink on the thermostat LCD.

2) To enable Normal Mode, press the [SENSOR ON/OFF] key, then the [OUTPUT] key. The unit will respond by saying "OFF" to indicate that Normal Mode is set. The Sun  or Moon  icon will appear on the thermostat LCD.

### TouchTone Commands:

Call the Sensaphone. When the unit answers, it will begin reciting a status report. At any time during the call, press a Touch-Tone. The unit will respond with "OK." The Sensaphone is now ready to accept Touch-Tone commands.

1) To enable Vacation Mode, press SRO (776). The unit will respond by saying "ON" to indicate that Vacation Mode is set. The Suitcase icon  will appear and blink on the thermostat LCD.

2) To enable Normal Mode, press SRO (776). The unit will respond by saying "OFF" to indicate that Normal Mode is set. The Sun  or Moon  icon will appear on the thermostat LCD.

3) To check the status of the output press WRO (976). The unit will respond "OFF" for Normal Mode or "ON" for Vacation Mode.

4) Hang up.

### 8.3.2 DUAL THERMOSTAT CONTROL

When a three or four wire low voltage thermostat is used, it is easy to connect the Sensaphone to your furnace with the addition of a secondary thermostat. One thermostat is set to your preferred "away" temperature and the other thermostat is set to your preferred "home" temperature. With your Sensaphone 400, you will be able to switch between these two thermostats using the relay output.

Ideally, the "away" thermostat would be in your pump or furnace room. Remember that your "away" thermostat will be the only thermostat that keeps your cottage or cabin at minimal heat while you are away. It should

not be located near a window or where direct sunlight might warm it, near a furnace radiator or vent, or any heat source such as a pilot light.

The second thermostat, the one pre-set for your preferred temperature when you arrive at your cottage or cabin, should be located in your normal living space. This would likely be your existing thermostat, already located in a suitable location by your heating professional at the time your furnace was installed.

By connecting these two thermostats together in a parallel fashion, and by passing the low voltage supply through the Sensaphone (See Figure 1), you can remotely or locally decide which thermostat is in control of your furnace.

It is recommended that the “away” thermostat be connected to the NC (Normally Closed) terminal while the “home” thermostat be connected to the NO (Normally Open) terminal of the Sensaphone. This way, it’s easy to understand which state your furnace is in: Output ON = Home and Output OFF = Away. The supply voltage from your furnace (typically the wire labeled R or 24VAC), should always be connected to the C (Common) terminal on the 400.

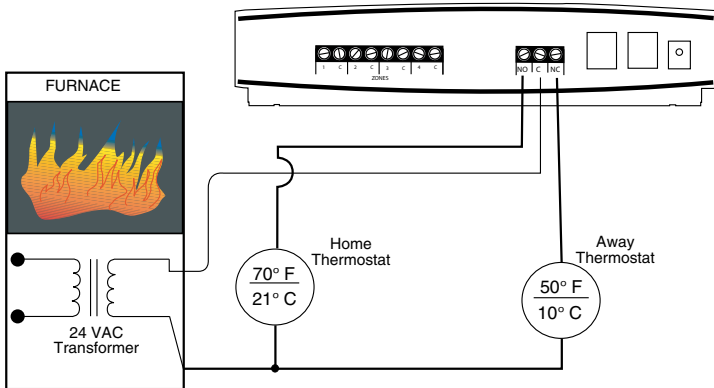


Figure 1: Dual Thermostat Setup

**Note:** This is a typical configuration when using standard single-zone heat/cool thermostats. For ease-of-use it is recommended that both thermostats be the same model. Note also that all thermostats may not be compatible with the dual-thermostat wiring diagram. Consult your heating/cooling professional for installation assistance.

### 8.3.3 CONTROLLING LIGHTS OR OTHER DEVICES

Using X10 technology, you can remotely activate any electrical device or appliance in your home through your Sensaphone. X10 technology is a suite of control modules that plug into your existing electrical outlets and transmit coded signals to lamps, lights, and appliances to turn them on or off (See Figure 2).

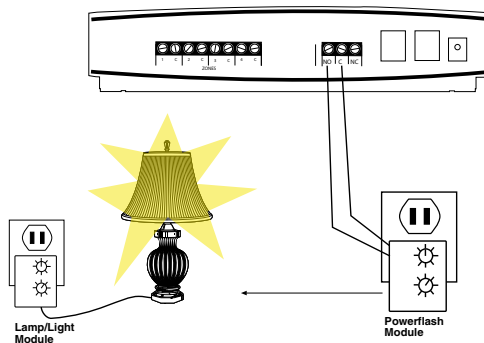


Figure 2: X10 Lighting Control Setup

Sensaphone supports these devices through use of the popular X10 Powerflash relay interface. To learn more about this technology, consult X10 products on the web at [www.x10.com](http://www.x10.com) or visit your local electronics shop such as Radio Shack.

Such applications may include turning on a lamp or exterior lights remotely from your cellular telephone when arriving at your residence late at night. Or you can use the X10 Powerflash Module (set to momentary contact) in conjunction with the X10 Universal Module to remotely control your electric garage door opener over the telephone—an ideal way of letting in your service personnel without being on-site. You may also use the X10 technology to send the ON/OFF signal to a furnace or heater if your thermostat is not easy to wire directly.

Finally, in addition to remotely controlling devices, X10 technology lets you extend the reach of certain Sensaphone sensors such as door contacts, motion sensors, or water sensors. This is of great benefit where it is impossible to wire directly from your sensors to your Sensaphone. Consult a qualified electrician or your heating professional for assistance with locating your remote sensors or contact your Sensaphone dealer.

## **APPENDIX A: WEEKLY TESTING PROCEDURE**

We recommend that you test your Sensaphone weekly to be sure it is functioning properly. This will ensure that when a problem arises the Sensaphone will be ready to alert the appropriate personnel.

There are several tests that can be performed:

- 1) Call the unit and listen to the Status Report. This will test the unit's ability to answer the phone and speak a message. It will also verify that all of the zones are reading properly, the alarm conditions are OK, the electricity is on, the microphone is functioning, and the batteries are OK.
- 2) Create an alarm on each zone by tripping all connected sensors.  
Temperature sensors: Heat or cool the sensor.

Motion sensors: Have someone walk in front of the sensor.

Door/window sensors: open the door/window.



**Water sensors:** Apply a small amount of water beneath the sensor or use a wet towel and touch it to the sensor probes.

**Humidity sensors:** Raise the humidity around the sensor by holding a cup of very hot water beneath the sensor.

Allow the unit to contact all programmed telephone numbers. This will make sure that the Sensaphone is programmed properly. It will also prepare personnel to respond appropriately when they receive a call from the Sensaphone.

- 3) Test the batteries by unplugging the AC adapter and making sure that the Sensaphone continues to function. Press WHAT IS, then STATUS on the keypad, and listen to the status report. Make sure the report states that "the power is off" and "batteries are OK." Keep the AC adapter unplugged so that a Power Failure alarm occurs. Allow the unit to dial all programmed telephone numbers while running on battery backup. Plug in the AC adapter after the unit has finished dialing all of the telephone numbers.
- 4) If you are using your Sensaphone to listen for a smoke alarm, then be sure to test the smoke alarm to make sure that the Sensaphone picks up the audible signal and triggers a high-sound-level alarm. Allow the unit to dial all programmed telephone numbers.
- 5) Keep a log of your tests, noting the date and whether the 400 passed in each category tested. An example of such a log is shown below. (See "Test Log" at the end of this manual.)

400 Test Log							
Date	Inputs		Dialout		Call-in		Tested by
7/1/04	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Bob H
7/15/04	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Alex G.
7/22/04	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input checked="" type="checkbox"/>	Fail <input type="checkbox"/>	Bob H.
	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	
	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	Pass <input type="checkbox"/>	Fail <input type="checkbox"/>	

If you require assistance, call Sensaphone Technical Support at 877-373-2700.

## APPENDIX B: TROUBLESHOOTING

In the event that a problem is encountered, this section will assist you in determining the cause, so you can return the unit to its usual monitoring routine with minimal interruption.

Most problems with the Model 400 are easy to identify and quickly corrected, and are found under the following general headings:

- Error Messages
- Communications/dial-out functions
- Temperature monitoring
- Sound level monitoring
- Other monitoring functions

If you have tried the solutions outlined in this section and are not satisfied with the results, call Sensaphone Technical Support at 877-373-2700, or follow the guidelines for shipping the Model 400 to Sensaphone for repair (see Appendix F).

### ERROR MESSAGES

Problem	Cause	Solution
The unit says “Error 1.”	An invalid value has been entered or too much time has passed without entering a value.	Only enter values within the allowed programming range, and make programming changes in a timely fashion.
The unit says “Error 2.”	Programming changes were attempted without unlocking the keypad.	Unlock the keypad, then make programming changes.

**COMMUNICATIONS / DIAL OUT**

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
1)The Model 400 fails to dial out.	<p>a) The telephone number may be incorrectly programmed.</p> <p>b) Tone or pulse (the current dialing method) is not compatible with the telephone line on which the Model 400 is installed.</p> <p>c) Recognition Time is too long. An alert condition does not remain in effect long enough to become a valid alarm.</p> <p>d) The Model 400 is connected to an incompatible telephone line.</p>	<p>Recheck programming steps. Refer to Chapter 4, Section 4.2.1.</p> <p>Switch from the current setting: from tone to pulse, or from pulse to tone. Refer to Chapter 4, Section 4.3.</p> <p>Reprogram Recognition Time. Set the Recognition Time to the minimum duration required to create a valid alarm. If possible, test the new setting by deliberately creating an alert condition. Refer to Chapter 5, Section 5.3.</p> <p>The Model 400 must be connected to a standard (2-wire analog) telephone line, not a digital extension to a phone system. If the unit will not dial out and the factors previously listed have been ruled out, try connecting the unit to a standard residential telephone line.</p>

Problem	Cause	Solution
2. The Model 400 will not answer the telephone when called for a Status Report or alarm acknowledgment.	<p>a) Rings Until Answer is incorrectly programmed.</p> <p>b) The Model 400 is connected to an incompatible telephone line.</p>	<p>Recheck programming of Rings Until Answer. Refer to Chapter 4, Section 4.5.1.</p> <p>Some telephone systems will not allow the telephone to ring beyond 4 rings. If your Model 400's Rings Until Answer is set at more than 4 rings, you may not be able to access the unit. Try setting the Rings Until Answer to less than 4 rings. If this does not correct the problem, it may indicate telephone line incompatibility. In this case, try connecting the Model 400 to a standard, residential telephone line.</p>
3. The Model 400 will not answer the telephone for Callback Acknowledgement.	You did not allow the telephone to ring 10 times. Note: If the TAD (telephone answering device) is disabled, the telephone rings ten times before the Model 400 answers. If the TAD is enabled, you must call the unit and let the line ring once, then hang up, wait ten seconds and call back again within 30 seconds.	When calling the Model 400, and the TAD is disabled, allow the telephone to ring 10 times. Refer to Chapter 6, Section 6.1.3, and Chapter 4, Section 4.6.3.
4. The Model 400 recites the alarm message or Status Report over the telephone, but is silent at the installation site.	The local voice mute feature is in effect.	Deactivate local voice mute. Refer to the programming steps in Chapter 4, Section 4.9.
5. The Model 400 and telephone answering device (sharing the same line) answer incoming calls simultaneously.	The Model 400's number of Rings Until Answer is set to equal the number of rings set for the telephone answering device.	Change the number of Rings Until Answer for the Model 400. Refer to Chapter 4, Section 4.5.

## TEMPERATURE MONITORING

Problem	Cause	Solution
1. Can't program temperature limits; or the unit won't read the temperature sensor.	The zone isn't configured to read a temperature sensor.	Press SET and CONFIGURE to program the zone. (See Section 5.1.1 for more information on configuring zones.)
2. The temperature reading is -20° F or -30° C.	The temperature sensor has been disconnected or has broken wires.	Examine the wires to temperature sensor and connect or replace wiring.
3. Temperature reads 150° F or 65° C.	Temperature sensor wires are touching or have shorted.	Verify and correct wiring.
4. Temperature reading is inaccurate.	<p>a) Temperature sensing may be affected by a source of ambient heat (ie., direct sunlight, or heat duct proximity).</p> <p>b) Temperature may require calibration.</p> <p>c) The unit is using the wrong temperature scale (Fahrenheit vs. Celsius).</p>	<p>Try moving the unit to a different location.</p> <p>After moving or placing the unit away from ambient heat sources, the temperature may be calibrated to offset inaccurate normal reading by several degrees. Refer to Chapter 5, Section 5.6.</p> <p>Verify temperature scale. Refer to Chapter 5, Section 5.5.</p>
5. False high temperature alarms from freezer.	Most freezers have a defrost cycle during which the temperature will rise considerably, thus causing an alarm to occur.	Program an zone recognition time longer than the defrost cycle.
6. The Sensaphone calls with a high/ low temperature alarm but recites a temperature that's within the programmed limits.	The Sensaphone recites the "current" temperature when it calls you, not the temperature at the time the alarm occurred. It is likely that the temperature has changed since the time the alarm was detected and has since returned to normal operating conditions.	Shorten the Call Delay or lengthen the Zone Recognition Time.

**SOUND LEVEL MONITORING**

<b>Problem</b>	<b>Cause</b>	<b>Solution</b>
1. False high sound alarms occur frequently.	<p>The programmed sound sensitivity results in over-sensitivity to non-alarm sound as well as alarm sound.</p> <p>Sound Recognition Time is too short.</p>	<p>Reprogram the sound sensitivity. Refer to Chapter 5, Section 5.10.</p> <p>Lengthen the sound Recognition Time. Refer to Chapter 5, Section 5.10.</p>
2. High sound does not cause an alarm.	The unit is not close enough to the high sound source, or the programmed sound setting results in a lack of sensitivity to high sound.	<p>Move the unit closer or reprogram the sound sensitivity. Refer to Chapter 5, Section 5.10.</p>

## OTHER MONITORING

Problem	Cause	Solution
1. Alarm status of an alert zone is incorrect.	Incorrect zone normality.	Reconfigure the zone. Refer to Chapter 5, Section 5.1.
2. False power out alarms	Programmed Recognition Time is too short.	AC power is often subject to brief interruptions. To avoid frequent, false alarms, increase the power Recognition Time. Refer to Chapter 5, Section 5.9.
3. The Model 400 does not recognize power failure.	a) Batteries are either incorrectly installed or drained.	To verify proper battery function, unplug the unit and verify continued operation using batteries only. If unit ceases to function, first try reinstalling the batteries. If this is not successful, replace the batteries. Refer to Chapter 2, Section 2.4 for complete instructions.
	b) Recognition time setting is too long.	Reprogram Recognition Time. Set the Recognition Time to the minimum required before a valid alarm occurs. If possible, test the condition by deliberately creating an alert condition. Refer to Chapter 5, Section 5.9.

<p>4. The Model 400 does not recognize any alarm.</p>	<p>a) Zones for alarm are disabled.</p> <p>b) Programmed Recognition Time is too long.</p>	<p>Enable the zones for alarm. Refer to Chapter 5, Section 5.2.</p> <p>Reprogram Recognition Time. Set the Recognition Time to the minimum required for a monitored condition to become a valid alarm. If possible, test the condition by deliberately creating an alert condition. Refer to Chapter 5, Section 5.3.</p>
<p>5. The batteries drain prematurely.</p>	<p>The unit's AC transformer is unplugged or for some other reason, full AC power is not available to the unit.</p>	<p>The batteries will take over powering the unit when the AC transformer is unplugged from the 120 VAC outlet. When storing the unit, be sure to remove the batteries. Refer to Chapter 2, Section 2.4.</p> <p><i>Be sure to use alkaline batteries—do not use rechargeable batteries.</i></p>

If the solutions offered above do not appear to correct the problem, apply the following steps, in the order shown.

- Remove the batteries.
- Unplug the unit.
- Wait one minute for the Model 400 to completely power down.
- Plug in the unit's AC adaptor into a standard 120 VAC outlet.
- Replace the batteries.

Refer to Chapter 2, Installation, for additional information on batteries and installation procedures.





**APPENDIX C: 400 QUICK REFERENCE**

Parameter	Description	Key Sequence*	Range	Default
Call Delay	Time delay until first call is made	[SET] or [WHAT IS] + [CALL DELAY]	Min: 00:00 Max 60:00 (min:sec)	00:30 (min:sec)
Voice Reps	Number of times alarm message is repeated over the phone	[SET] or [WHAT IS] + [VOICE REPS]	Min: 1 rep Max: 10 reps	3 reps
Intercall Time	Time delay between phone calls	[SET] or [WHAT IS] + [INTERCALL TIME]	Min: 00:10 Max: 60:00 (min:sec)	01:00 (min:sec)
Max Calls	Number of calls until unit self-acknowledges	[SET] or [WHAT IS] + [MAX CALLS]	Min: 1 call Max: 255 calls	100 calls
Temp Limits	High and low temperature alarm limits	[SET] or [WHAT IS] + [TEMP LIMITS] + [zone #]	Min: -20°F/-30°C Max: 150°F/65°C	Low: 10°F High: 100°F
Calibrate	Temperature Correction factor	[SET] or [WHAT IS] + [CALIBRATE] + [zone #]	Min: -10° Max: 10°	0°
Recognition Time: zones 1-4	Length of time a fault condition must exist to trip an alarm	[SET] or [WHAT IS] + [RECOGNITION TIME]	Min: 00:00 Max: 540:00 (min:sec)	00:03 (min:sec)
Recognition Time: Power Failure	Length of time the power must be off to trip an alarm	[SET] or [WHAT IS] + [RECOGNITION TIME] + [POWER]	Min: 0:00 Max: 540:00 (min:sec)	05:00 (min:sec)
Recognition Time: High Sound Level	Length of time the sound must be high to trip an alarm	[SET] or [WHAT IS] + [RECOGNITION TIME] + [SOUND]	Min: 5 Max: 60 (sec)	00:08 (min:sec)
Clock	Real time clock	[SET] or [WHAT IS] + [CLOCK] + [time] + [AM] or [PM]		12:00 AM
High Sound Level Alarm Sensitivity	Microphone sensitivity for high sound level alarm	[SET] or [WHAT IS] + [CALIBRATE] + [SOUND]	Min: 1 unit Max: 160 units	32 units
Listen Time	Length of listen-in time during call-in status report	[SET] or [WHAT IS] + [LISTEN TIME]	Min: 0 sec Max: 255 sec	15 sec
Rings Until Answer	Number of rings until unit answers an incoming call	[SET] or [WHAT IS] + [RING]	Min: 1 ring Max: 15 rings	4 rings

\* press [ENTER] after all Key Sequences starting with [SET]

Parameter	Description	Key Sequence*	Range/ Response	Default
TAD	Telephone Answering Device Compatibility	[SENSOR ON/OFF] + [TAD]	Enable / Disable	Disabled
ID Number	Sets the unit's telephone number	[SET] + [ID NUMBER]	0-16	
Dialout Test	Permits testing of dialout Telephone numbers	[SET] + [TEST] + [1-4]	1-4	
Output Mode	Sets the relay output Mode	[SET] + [OUTPUT]	1-4, *, #, PHONE	Manual
Output Control	Switches the relay output On or Off (manual mode)	[SENSOR ON/OFF] + [OUTPUT]		Off
Voice Message	Program or recite voice messages	[SET] or [WHAT IS] + [MESSAGE] + [RECOGNITION TIME] + [zone#]	0-4	
Zone Configuration	Program or recite zone configuration	[SET] or [WHAT IS] + [CONFIG]	temp, NO, NC	No
Call Progress	Turns call progress Detection on or off	[SENSOR ON/OFF] + [CONFIG]	Enable / Disable	Enabled
Telephone Number	Program or recite dialout telephone numbers	[SET] + [PHONE NUMBER] + [1-4]		
Status Report	Recites a Status Report	[WHAT IS] + [STATUS]		
Run/Standby Mode	Changes the operating mode between run and standby	[RUN/STANDBY]		Run

Parameter	Description	Key Sequence	Response	Default
Speaker Mute	Turns off the speaker during alarm conditions	[SENSOR ON/OFF] + [MUTE]	On or Off	off
Designating A Zone Unused	Removes zone from status and alarm reports	[SENSOR ON/OFF] + [SET] + [zone #]	On or Off	On
Zone Enable/Disable	Turns zone alarm detection on or off	[SENSOR ON/OFF] + [zone#]	Enabled / Disabled	Enabled
Power Alarm Enable/Disable	Turns power alarm detection on or off	[SENSOR ON/OFF] + [POWER]	Enabled / Disabled	Enabled
Sound Alarm Enable/Disable	Turns high sound level alarm detection on or off	[SENSOR ON/OFF] + [SOUND]	Enabled / Disabled	Enabled
Temperature Scale	Selects between Fahrenheit and Celsius	[SENSOR ON/OFF] + [F/C]	Fahrenheit or Celsius	Fahrenheit
Security Code	Prohibits programming changes	[SET] or [WHAT IS] + [CODE] + [4 digit code]		none
Callback Acknowledgment	Turns Callback Acknowledgment on or off	[SENSOR ON/OFF] + [PHONE]	Enabled / Disabled	Disabled



## APPENDIX D: ACCESSORIES

The sensors listed below are available from Sensaphone and represent the most commonly used zone devices. Other dry contact sensors, designed for more specialized applications, may also be used. Commercial or industrial electrical supply houses can provide devices to monitor virtually any condition. For further information, contact Sensaphone Customer Service at 877-373-2700.

PART #	SENSOR / SWITCH
FGD-0006	Magnetic Reed Door and Window Switch
FGD-0007	Infrared Motion Detection Sensor
FGD-0010	50' two-conductor #22AWG Shielded Cable
FGD-0013	Spot Water Detection Sensor
FGD-0022	Temp Alert Temperature Switch
FGD-0064	Dual Setback Thermostat
FGD-0027	Humidistat Humidity Switch
FGD-0049	Smoke Detection Sensor for 110VAC
FGD-0054	PowerOut Alert Power Failure Switch
FGD-0056	Zone Water Detection Sensor
FGD-0063	Additional 10' Water Rope for FGD-0056
XFR-0024	12VDC Power Supply for Thermostat
FGD-0100	Room Temperature Sensor
FGD-0101	Weatherproof Temperature Sensor
FGD-0205	Multi-Point Wireless I/O System



# APPENDIX E: SPECIFICATIONS

## ALERT ZONES

**Number of Zones:** 4 (thermistor installed on zone #1 for local temperature monitoring)

**Zone Connector:** terminal block

**Zone Types:** N.O./N.C. contact, 2.8K thermistor ( -20° F to 150° F or -30° C to 65° C )

**Zone Characteristics:** 5.11K to 2.85V (Short circuit current: 1mA max.)

**A/D Converter Resolution:** 10 bits  $\pm 2$  LSB

**Zone Protection:** 5.5VDC Metal Oxide Varistor with fast acting diode clamps.

## MICROPHONE

**Internal Electret Condenser:** For listening in to on-site sounds and detecting high sound levels.

## PHONE INTERFACE

**Line RJ11 Jack:** For connection to a two-wire analog telephone line. (6' modular cord included)

**Extension RJ11 Jack w/ Line Seizure:** For connecting other devices on the same telephone line, devices connected to this jack are disconnected in the event that the 400 must dial out for an alarm.

**Phone Line Protection:** Metal Oxide Varistor & self-resetting fuse

## LED INDICATOR

**System On:** On steady when the unit is in RUN mode. LED blinks once every few seconds while in STANDBY mode.

**Phone In Use:** On steady when the telephone line is being used. LED blinks when no dial tone is detected. Off when telephone line is not in use.

**Alarm:** Off when no alarm exists. Blinks when an unacknowledged alarm exists. On steady when an acknowledged alarm exists

**Battery Ok:** On steady when the battery is in good condition. Blinks when the battery is low. Off when the battery must be replaced.

## RELAY OUTPUT

Rated for 1A 30VAC/1A 30VDC maximum.



## **POWER SUPPLY**

**Power Supply:** 120VAC/12VDC 60Hz 6W wall plug-in transformer w/6' cord.

**Power Consumption:** 1.5 Watts

**Power Protection:** Metal Oxide Varistor

**Battery Backup:** Six size-C alkaline batteries (not included), providing up to 24 hours of back-up time.

## **ENVIRONMENTAL**

**Operating Temperature:** 32–122° F (0–50° C)

**Operating Humidity:** 0–90% RH non-condensing

**Storage Temperature:** 32°–140° F (0–60° C)

## **PHYSICAL**

**Dimensions:** 2.1”h x 7.8”w x 8.8”d

**Weight:** 2 lbs.

**Enclosure:** Indoor-rated plastic housing suitable for wall or desktop installation.

**Alarm:** Off when no alarm exists. Blinks when an unacknowledged alarm exists. On steady when an acknowledged alarm exists

**Battery Ok:** On steady when the battery is in good condition. Blinks when the battery is low. Off when the battery must be replaced.

## **STANDARDS**

- FCC Part 15 Class B, USA Emission Standards
- FCC Part 68 (47 C.F.R. Part 68), USA Telecommunications Standards
- ICES-003 Issue 4 Class B, Canadian Emission Standards
- Complies with CS-03 Issue 8, Canadian Telecommunications Standards
- NRTL Listed for compliance to UL60950-1, USA Safety Standards
- NRTL Listed for compliance to CSA C22.2 No. 60950-1, Canadian Safety Standards

## **APPENDIX F: RETURNING THE UNIT FOR REPAIR**

In the event that the Model 400 does not function properly, we suggest that you do the following:

- 1) Record your observations regarding the Model 400's malfunction.
- 2) Call the Technical Service Department at 877-373-2700 prior to sending the unit to Sensaphone for repair.

If the unit must be sent to Sensaphone for Servicing, please do the following:

- 1) Unplug the AC power supply from the wall outlet, remove the batteries, and disconnect all sensors from the alert zones.
- 2) Carefully pack the unit to avoid damage in transit. Use the original container (if available) or a sturdy shipping box.
- 3) You must include the following information to avoid shipping delays:
  - a) Your name, address and telephone number.
  - b) A note explaining the problem.
- 4) Ship your package to the address below:

### **SERVICE DEPARTMENT**

#### **SENSAPHONE**

**901 Tryens Road**

**Aston, PA 19014**

- 5) Ship prepaid and insured via UPS or US Mail to ensure a traceable shipment with recourse for damage or replacement.



## APPENDIX G: TEST LOG

[illegible]

# SENSAPHONE 400 User's Manual

[illegible]





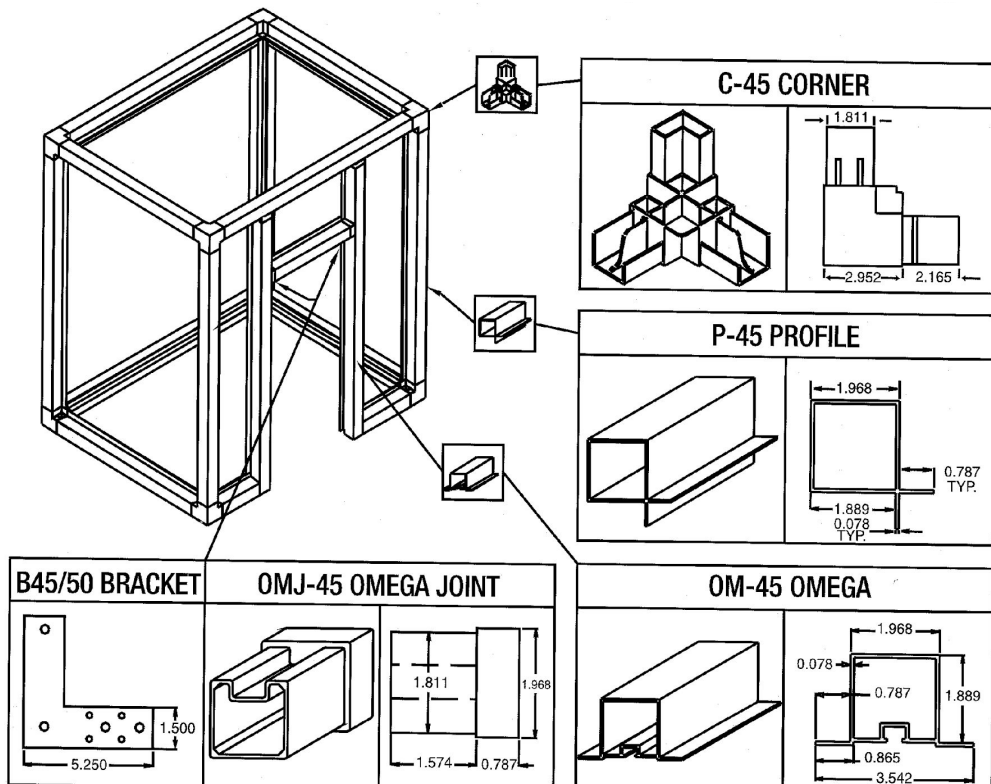


# Enclosure Specification Modular System



501 South Main Street  
Spring City, PA 19475  
1-800-962-0670

- Enclosure shall be designed to fit just around the equipment to keep cost down. A 4" clearance is the standard dimension provided between the enclosure and the equipment on all sides and the top.
- Each sound enclosure should be factory assembled and skidded or shipped knocked down. The enclosure shall be designed to incorporate: forced air ventilation with acoustically treated air intake and exhaust. Fan will be sized to maintain a temperature outside/inside variation no greater than 15°F.
- The enclosure frame shall be made of a heavy-duty aluminum square-tubing frame that allows each wall and roof panel to be removable. A three directional slip fit aluminum corner fitting piece shall be provided at each of the eight corners to connect all aluminum frame pieces together.
- Acoustic panels shall have 18 gauge aluminized steel channel provided for bottom caps, top caps, and openings.
- Acoustic panels:
  - Wall and roof panels shall have exterior skin of 18-gauge aluminized steel. Skin shall be 2.5#/ft<sup>2</sup>
  - 2" absorption material, sound absorbing embossed densified polyurethane foam.
- All doors will be provided with acoustic seals on all four sides with stainless steel or nylon handles and hinges.
- All side panels to be easily removable via a quick release clamp.
- Panel acoustical performances have been tested by an independent laboratory and achieve a NRC = 1.0. Expected 20-25 dba reduction when measured at 1 meter in a free field.

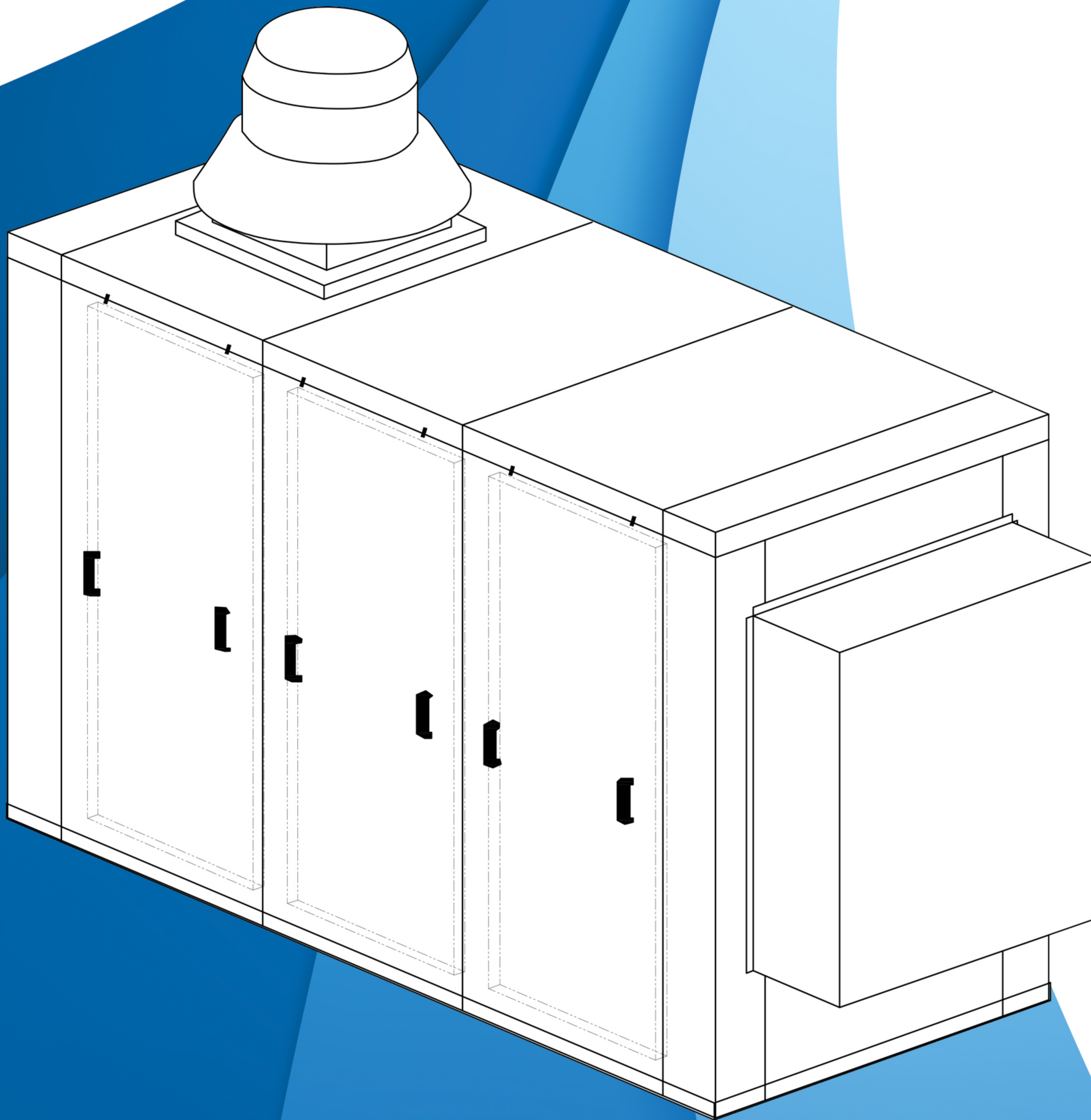


See a complete listing of our noise reduction products online at  
[www.acousticalgroup.com](http://www.acousticalgroup.com)





APPLIED  
ACOUSTICAL  
GROUP



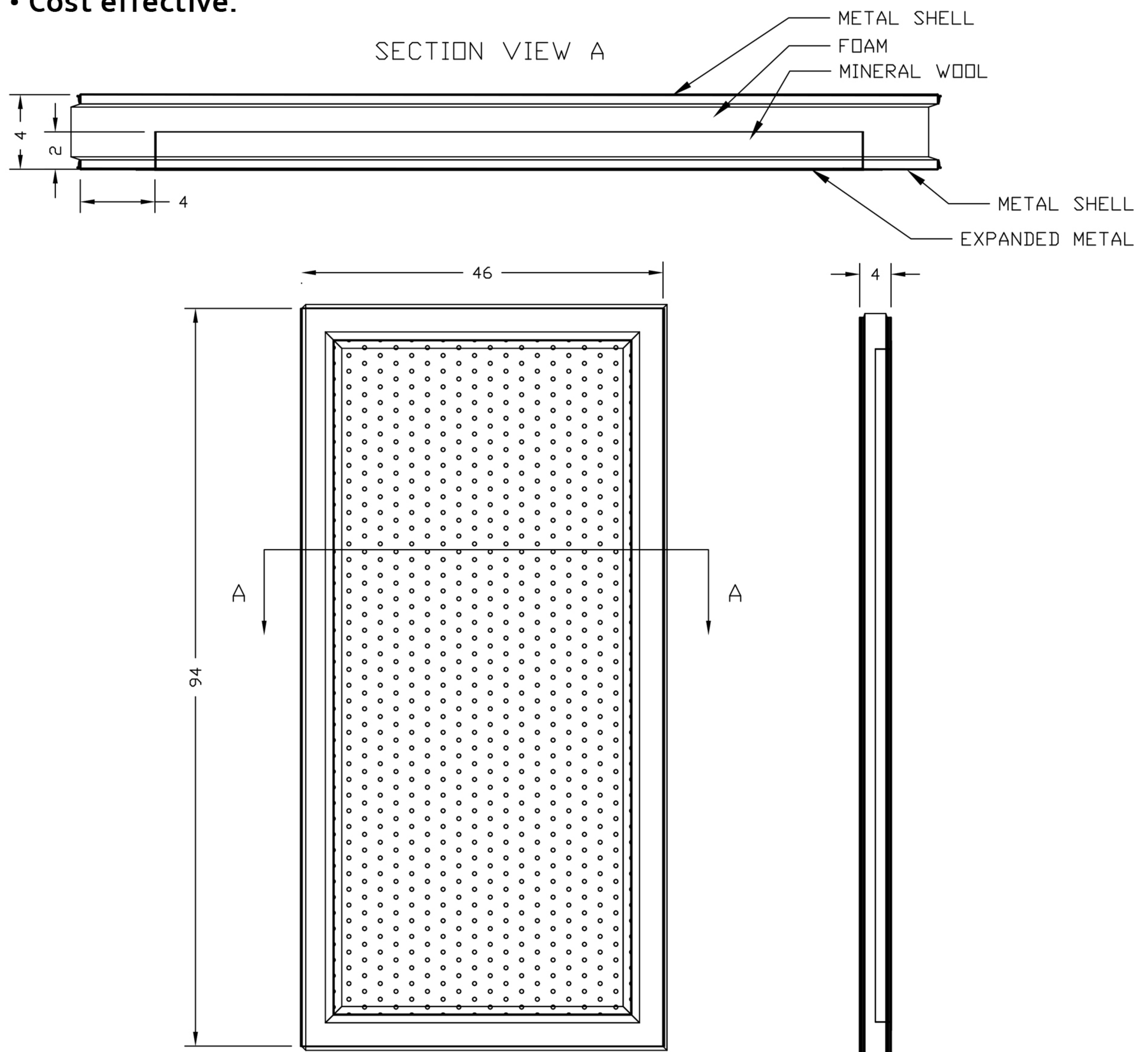
ACOUSTICAL ENCLOSURE PRODUCT GUIDE  
-PATENT PENDING-



## **"Controlling your environment so you can control your process"**

### **Benefits:**

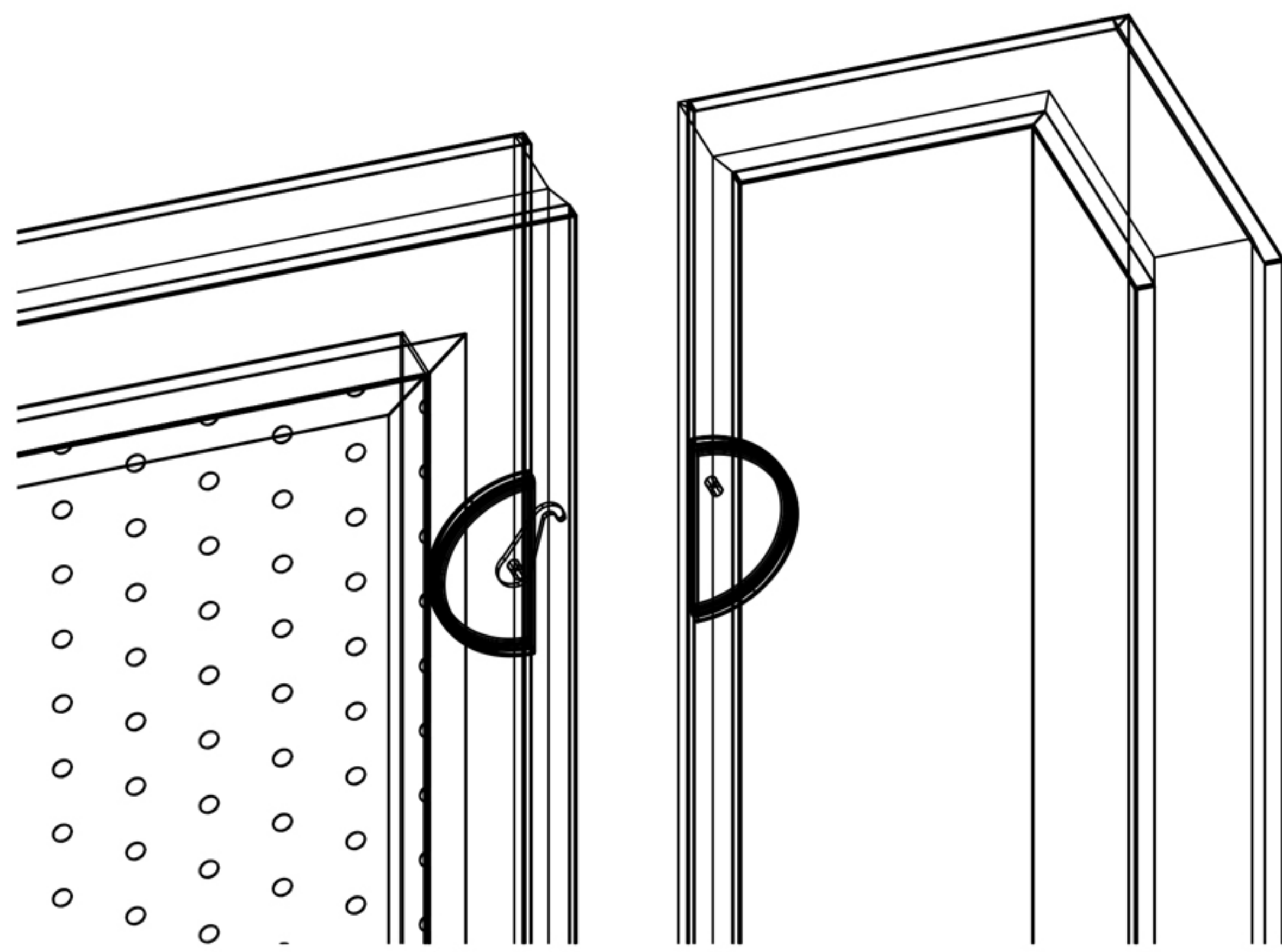
- AAG enclosures are the easiest sound enclosures to install on the market.
- Lead time is 4-6 weeks from drawings approval.
- Our standard galvalume outer shell lasts almost 9.3x longer than the industry standard galvanized panel construction.
- "Screwless assembly"- Due to our formed-in-place panel locking system, our panels do not need hundreds of screws to assemble, making these units even more appealing to a customer that may need to move or take down the units multiple times.
- Manufactured in the USA in an ISO certified facility.
- Cost effective.



PATENT PENDING

APPLIED ACOUSTICAL GROUP - ACOUSTICALGROUP.COM - (610) 495-9702





#### **Base Model Features:**

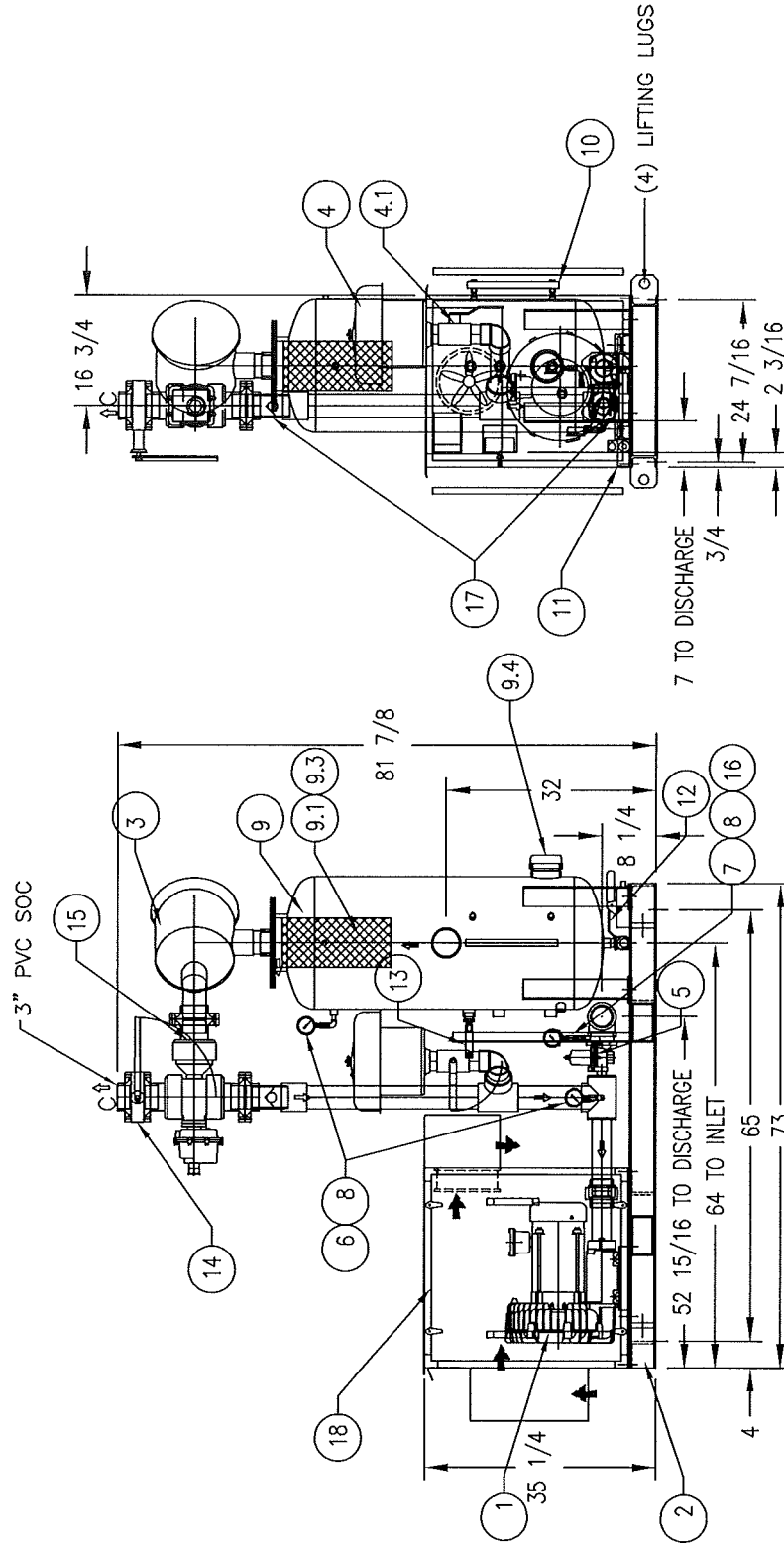
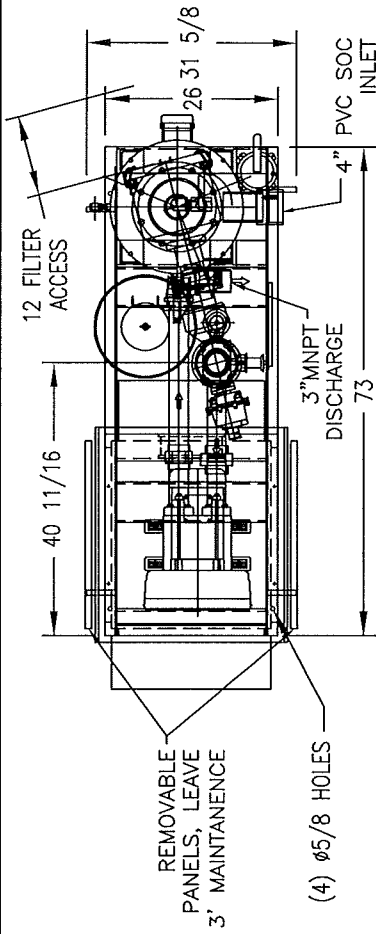
- STC rating of 30.
- NRC rating of .90.
- 2.54 lbs psf.
- Removable panels.
- Closed cell urethane foam combined with a layer of 4lb/psf density mineral wool.
- 10 year panel warranty.
- Embossed Galvalume finish. On average lasts 9.3x longer than galvanized.
- 20 year rust-through warranty on galvalume finish.
- Forced air ventilation system.
- Installation drawings.
- "Formed-in-place" panel locking mechanism.
- The prefabricated urethane foamed panels shall be supplied with Class 1 fire hazard classification according to UL 723 (ASTM-E-84), as tested by Underwriters Laboratories Inc. Panels shall have a flame spread rating of 25 or less.
- The panels are provided with PVC gaskets which are "formed-in-place" on both interior and exterior sides of the panels. The gaskets are impervious to all stains, greases, mildews, etc. They ensure an airtight seal and also eliminate the need for seam caulking.

**Other Finish Options:** Powder coated, Stainless Steel, aluminum, embossed galvalume (standard). 16-26 guage steel thickness.

PATENT PENDING

APPLIED ACOUSTICAL GROUP - ACOUSTICALGROUP.COM - (610) 495-9702





- NOTES:
1. CUSTOMER PIPING TO BE INDEPENDENTLY SUPPORTED
  2. TOLERANCE  $\pm 1/2"$
  3. MOTORS NOT RATED FOR VFD USE
  4. SPREADER BARS ARE REQUIRED WHEN LIFTING PACKAGE WITH A CRANE TO AVOID DAMAGE.

DATE	5/15/15	J.E.GASHO & Assoc., Inc.
DRAWN BY:	JJH	460 W. GAY ST.
APPROVED BY:		WEST CHESTER, PENNSYLVANIA 19380
DIMENSIONS IN INCHES		
SCALE	NA	
TOLERANCE	$\pm 1/2"$	
WEIGHT	1000	
REV.	A	
DATE	8/1-7/8 DIM WAS 71-7/8	
DESCRIPTION		
SHEET	3	OF 3
JG15-D-2974-1		A

SVE BLOWER PKG- C  
 ROTRON 757  
 GX 60 MS, SE

**Interim Remedial Measure Work Plan**  
***Morton Village Plaza Shopping Center***

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**APPENDIX E**

**Sub-Slab Depressurization System Operations and Maintenance Log**

WEST BLOWER SUB-SLAB DEPRESSURIZATION SYSTEM OPERATIONS AND MAINTENANCE FORM			
Site Name:	Morton Village		Inspection Date: _____
Street Address:	1022 Old Country Road		
Location:	Plainview, NY		Inspection Personnel: _____
System:	Active Sub-Slab Depressurization System		_____
Blower:	Rotron EN757, 5.5 Hp (West Blower)		_____
Blower Range:	80 IWG pressure, 78 IWG vac, 310 cfm		
INSPECTION ITEM DESCRIPTION	Yes	No	Comments/ Actions Taken (list actions taken if "No" is checked)
Is the system operating normally?	___	___	_____
Are any warning lights on? (Please list those that are on)	___	___	_____
If there is an alarm condition, was it fixed and the system restarted?	___	___	_____
Is the blower enclosure in good condition?	___	___	_____
Are the valves (at blower and aboveground piping) in good condition?	___	___	_____
Is the vacuum filter in good condition?	___	___	_____
Does the knock-out tank need to be drained? (Record amount drained)	___	___	_____
Are aboveground piping free of cracks, leaks, and support issues?	___	___	_____
Are vacuum/pressure gauges at blower operating properly?	___	___	_____
Are interior piping free of cracks, leaks, and support issues?	___	___	_____
List maintenance activities that were performed or _____ other comments about the system: _____			
<b>Blower Influent</b>	<b>Vacuum (in. w.c.)</b>	<b>Comments</b>	
INF-W1 (after knock-out tank)			
Knock-out Tank-W			
<b>Blower Effluent</b>	<b>Pressure (in. w.c.)</b>	<b>Comments</b>	
EFF-W1			
<b>Soil Vapor Monitoring Point*</b>	<b>Vacuum (in. w.c.)</b>	<b>Comments</b>	
OSV-1			
MP-1			
OSV-6			
OSV-7			
PERFORM THE FOLLOWING ONLY IF A VACUUM READING AT THE SVMPS IS LESS THAN 0.004 IN. W.C.			
INSPECTION ITEM DESCRIPTION	Yes	No	Comments/ Actions Taken (list actions taken if "No" is checked)
Are interior vacuum gauges operating properly?	___	___	_____
<b>Suction Point*</b>	<b>Vacuum (in. w.c.)</b>	<b>Comments</b>	
SP-1			
SP-2			
SP-3			
SP-4			
SSDS-1			
SSDS-2			

in. w.c. - inches of water

\* Refer to figure for locations of Soil Vapor Monitoring Points and Suction Points

EAST BLOWER SUB-SLAB DEPRESSURIZATION SYSTEM OPERATIONS AND MAINTENANCE FORM			
Site Name: _____ Street Address: _____ Location: _____ System: _____ Blower: _____ Blower Range: _____	Morton Village 1022 Old Country Road Plainview, NY Active Sub-Slab Depressurization System Rotron EN757, 5.5 Hp (East Blower) 80 IWG pressure, 78 IWG vac, 310 cfm	Inspection Date: _____  Inspection Personnel: _____ _____	
INSPECTION ITEM DESCRIPTION	Yes	No	Comments/ Actions Taken (list actions taken if "No" is checked)
Is the system operating normally?	—	—	_____
Are any warning lights on? (Please list those that are on)	—	—	_____
If there is an alarm condition, was it fixed and the system restarted?	—	—	_____
Is the blower enclosure in good condition?	—	—	_____
Are the valves (at blower and aboveground piping) in good condition?	—	—	_____
Is the vacuum filter in good condition?	—	—	_____
Does the knock-out tank need to be drained? (Record amount drained)	—	—	_____
Are aboveground piping free of cracks, leaks, and support issues?	—	—	_____
Are vacuum/pressure gauges at blower operating properly?	—	—	_____
Are interior piping free of cracks, leaks, and support issues?	—	—	_____
List maintenance activities that were performed or _____ other comments about the system: _____			
<b>Blower Influent</b>	<b>Vacuum (in. w.c.)</b>	<b>Comments</b>	
INF-E1 (after knock-out tank)			
Knock-out Tank-E			
<b>Blower Effluent</b>	<b>Pressure (in. w.c.)</b>	<b>Comments</b>	
EFF-E1			
<b>Soil Vapor Monitoring Point*</b>	<b>Vacuum (in. w.c.)</b>	<b>Comments</b>	
OSV-2			
MP-2			
SV-2			
OSV-4			
MP-3			
MP-4			
OSV-8			
PERFORM THE FOLLOWING ONLY IF A VACUUM READING AT THE SVMPS IS LESS THAN 0.004 IN. W.C.			
INSPECTION ITEM DESCRIPTION	Yes	No	Comments/ Actions Taken (list actions taken if "No" is checked)
Are interior vacuum gauges operating properly?	—	—	_____
<b>Suction Point*</b>	<b>Vacuum (in. w.c.)</b>	<b>Comments</b>	
SP-5			
SP-6			
SP-7			
SP-8			
SP-9			
SP-10			

in. w.c. - inches of water

\* Refer to figure for locations of Soil Vapor Monitoring Points and Suction Points

**Interim Remedial Measure Work Plan**  
***Morton Village Plaza Shopping Center***

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**APPENDIX F**

Health and Safety Plan



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## **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 Environmental Engineering and Geology, D.P.C. (Roux) 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)
- Implementation of Interim Remedial Measure (IRM) activities consisting of sub-slab depressurization system (SSDS) installation.

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
Urgent Care Center .....	631-435-0110
(For non-emergency medical services)	

Directions and maps to the Hospital and the Urgent Care Center 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:	Tally Sodre	(631) 232-2600	(516) 509-9332
4. Corporate Health & Safety Manager:	Brian Hobbs	(631) 232-2600	(631) 807-0193
5. Office Manager:	Michael Ritorto	(631) 232-2600	(631) 445-4576

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**

- 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) – Tally Sodre – Roux**

- 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**

- 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 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 Carbon Monoxide Hazards

Carbon monoxide (CO) is a colorless, odorless, and toxic gas, which is predominately produced by incomplete combustion of carbon-containing materials. Incomplete combustion occurs when insufficient oxygen is used in the fuel (hydrocarbon) burning process. Common sources of CO may include: motor vehicle exhausts, fuel burning<sup>1</sup>, furnaces, coal burning power plants, small gasoline engines including electric

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<sup>1</sup> Fuel burning may include natural gas, propane, fuel oil, kerosene, gasoline, coal, or other carbon-based items.

generators, demolition equipment, chain saws, lawn mowers and power washers, marine engines, fuel powered forklifts, propane or kerosene-powered heaters, and fuel burning water heaters.

Exposure to CO impedes the blood's ability to carry oxygen to body tissues and vital organs. When CO is inhaled, it combines with hemoglobin (an iron-protein component of red blood cells), producing carboxyhemoglobin, which greatly diminishes hemoglobin's oxygen-carrying capacity. **Hemoglobin's binding affinity for CO is 300 times greater than its affinity for oxygen.** As a result, small amounts of CO can dramatically reduce hemoglobin's ability to transport oxygen.

Common symptoms of CO exposure are headache, nausea, rapid breathing (i.e., shortness of breath), weakness, exhaustion, dizziness, and confusion (i.e., light headedness). Hypoxia (severe oxygen deficiency) due to acute CO poisoning may result in reversible neurological effects, or it may result in long-term (and possibly delayed) irreversible neurological (brain damage) or cardiological (heart damage) effects.

CO exposure can be dangerous during pregnancy for both the mother and the developing fetus. Please contact CDC-INFO (800-232-4636) if you have any questions regarding CO exposure during pregnancy.

At work sites where carbon-containing fuels are used, such as in internal combustion engines and generators, the exhausts from these units can contain significant concentrations of CO. In situations where the exhausts create exposure to CO, the exhausts of these units should be extended via appropriate hoses/piping to well ventilated exterior areas (i.e., outside and downwind of structures). Where the concentrations of CO exceed the following "action levels", notify the Project Manager and immediately implement the corresponding actions to mitigate exposure.

Action Levels Table (CO)

Carbon Monoxide (CO) Action Levels <sup>2</sup>	
Concentration of CO in air	Action
< 25 ppm	Inspect exhaust system for leaks or other sources of CO. Monitor initially and every 15 minutes during use of CO-generating equipment.

2 Based upon The American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) of 25 ppm as an 8-hour time-weighted average (TWA) [ACGIH 2014 TLVs® and BEIs®] and OSHA's Permissible Exposure Limit (PEL) of 50 ppm as an 8-hour TWA concentration [29 CFR Table Z-1].

25 – 50 ppm	Ventilate area. Monitor continuously and record measurements. Contact PM.
> 50 ppm	Stop work activities. Ventilate area.

### 6.1.2 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.

### 6.1.3 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.

### 6.1.4 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
Installation and sampling of soil vapor and sub-slab points and sampling of indoor air and SSDS piping	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's 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's 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's 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 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 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's 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/O<sub>2</sub>/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**

As a result of the hazards onsite and the conditions under which operations are conducted, the possibility of an emergency exists. An emergency plan is required by OSHA (29 CFR 1910.120) to be available for use and is included below. A copy of this plan shall be available in the Support zone at each work site.

In the event of an emergency situation, such as fire, explosion, significant release of particulates, etc., all persons in both the restricted and non-restricted areas will evacuate and assemble near the Support Zone or other safe area as identified by the Site Emergency Coordinator(s). The Site Emergency Coordinator(s) will have authority to initiate proper action if outside services are required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. The SHSO or SM must see that access for emergency equipment is provided and that all spark-producing apparatus has been shut down once the alarm has been sounded. Once the safety of all personnel is established, the fire department and other emergency response groups will be notified by telephone of the emergency. Then, other personnel listed in Section 12.4 shall be notified.

Note: This plan does NOT address post-emergency response operations since a specific HASP will be developed at that time as appropriate.

#### **13.1 Site Emergency Coordinator(s)**

The Site Emergency Coordinator(s) are:

Site Manager;

Site Health and Safety Officer;

Project Engineer; and

Facility Manager.

The Site Emergency Coordinator(s) shall implement this emergency plan whenever conditions at the site warrant such action. The coordinator(s) will be responsible for assuring the evacuation, emergency treatment, emergency transport of site personnel as necessary, and notification of emergency response units and the appropriate management staff.

#### **13.2 Evacuation**

##### Withdrawal Upwind

The work party will continually note general wind directions while onsite. Upon noting the conditions warranting movement away from the work site, the crew will move upwind a distance of approximately 100 feet or farther, as indicated by the site monitoring instruments. Donning SCBA and a lifeline, SHSO will return to the work site to determine if the condition noted was transient or persistent. If persistent, on-site

personnel will be notified of the situation and the need to leave the site or don SCBA. When access to the site is restricted and escape possibly hindered, the crew may be instructed to evacuate the site rather than move upwind, especially if withdrawal upwind moves the crew away from escape routes.

#### Site Evacuation

Upon determination of conditions warranting site evacuation, the work party will proceed upwind of the work site and notify the SHSO and the Client's Project Engineer of site conditions. If the hazard is toxic gas, respirators will be donned. The crew will proceed to the field office to assess the situation. The advisability and type of further response action will be coordinated and carried out by the SHSO, the PM and the Client's Project Engineer. Site evacuation routes are illustrated in Figure 7.

### **13.3 Potential or Actual Fire or Explosion**

If the potential for a fire exists or if an actual fire or explosion occurs, the following procedure will be implemented:

Immediately evacuate the site as described above (Section 12.2);

Notify Client's Project Engineer, SHSO and PM; and

Notify fire and security. Call **911**

Fire Department – \_\_\_\_\_

Police Department – \_\_\_\_\_

### **13.4 Environmental Incident (Release or Spread of Contamination)**

If possible, the spread of contamination should be controlled or stopped. The Facility Manager must be informed of the need to contact police and fire authorities to inform them of the possible or immediate need for nearby evacuation. If a significant release has occurred, the National Response Center and other appropriate groups should be contacted by the Facility Manager or his designee. Those groups will alert National or Regional Response Teams as necessary. Following these emergency calls, the remaining personnel listed in the table below shall be notified:

### Emergency Telephone Numbers

Type	Name	Telephone #
Fire Department	Fire Department	911
HazMat Emergency Response		911
Law Enforcement	Police Department	911
Hospital	North Shore University Hospital	(516) 719-3000
Ambulance		911
Urgent Care Center	Health Care Medical Services PLLC	(631) 435-0110
National Response Center (Release or Spill)		(800) 424-8802
Facility Manager	Ray Sohmer	(212) 951-3816
Client Project Manager	John-Patrick Curran	(646) 378-7215
Project Manager/SSO	Jeff Wills	(631) 232-2600 (Office) (516) 637-0213 (Cell)
Corporate H&S Manager	Brian Hobbs	(631) 232-2600 (Office) (631) 807-0193 (Cell)

These contacts and phone numbers will be posted in the SZ.

### 13.5 Personal Injury

If on-site personnel require emergency medical treatment, the following steps will be taken:

- 1) Notify the Project Manager, Principal, and OHSM to initiate Illness or Injury Case Management protocol (**See Appendix K for incident notification flow chart**).
- 2) Notify the Fire Department or Ambulance service and request an ambulance or transport the victim to the hospital, as appropriate.
- 3) Decontaminate to the extent possible prior to administration of first aid or movement to emergency facilities.
- 4) First aid will be provided by emergency medical services (EMS) or by on-site personnel trained in first aid, CPR, and blood borne pathogens, if available.
- 5) The OHSM will supply medical data sheets on the victim (if a Roux employee) to appropriate medical personnel.

Accident Report Forms and Medical Services Form are provided in Appendices F, G, and H. Incident Notification Flow Chart is provided in Appendix K. AllOne Health form is provided in Appendix L.

### 13.6 Overt Personnel Exposure

If an overt exposure to toxic materials should occur, the exposed person shall be treated onsite as follows:

Skin Contact:	Wash/rinse affected area thoroughly with copious amounts of soap and water, then provide appropriate medical attention. An emergency shower or drench system shall be accessible at the Site at all times. Utilizing eyewash, eyes should be rinsed for at least fifteen (15) minutes upon chemical contamination.
Inhalation:	Move to fresh air and/or, if necessary, decontaminate, and transport to the hospital.
Ingestion:	Decontaminate and transport to emergency medical facility.
Puncture Wound or Laceration:	Decontaminate and transport to emergency medical facility. SHSO will coordinate with the CHSM and the HR Director to obtain medical information on the injured if necessary.

### 13.7 Adverse Weather Conditions

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

Heavy rainfall;

High wind;

Potential for heat stress;

Potential for cold stress and cold-related injuries;

Limited visibility;

Potential for electrical storms – stop work for a minimum of 15 minutes after observing a lightning strike and for at least 15 minutes after the storm has passed;

Potential for malfunction of H&S monitoring equipment or gear; and

Potential for accidents.

### 13.8 Reportable Incidents at the Site

Since submission of the revised HASP, there has been no reportable incident(s) at the Site. Any incident where Roux's or Roux employees' vehicles are involved in a collision with structures, equipment, other vehicles, or pedestrians will result in the notification of Roux personnel and Client Managers and completion of an ACORD® Automobile Loss Notice Form (attached as Appendix J).

## 14.0 FIELD TEAM REVIEW

Each Roux 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 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

[illegible]



## 15.0 APPROVALS

By their signature, the undersigned certify that this HASP is approved and will be utilized at the Morton Village Site (1022 Old Country Road, Plainview, New York)

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Tally Sodre – Office Health and Safety Officer

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Date

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Brian Hobbs – Corporate Health and Safety Manager

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Date

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Jeff Wills – Project Manager

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Date

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 <sup>3</sup> )	TWA 25 ppm (125 mg/m <sup>3</sup> )	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 <sup>3</sup> )	C 50 ppm (300 mg/m <sup>3</sup> )	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 <sup>3</sup> ) STEL 2 ppm (8 mg/m <sup>3</sup> )	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 <sup>3</sup> )	TWA 200 ppm (790 mg/m <sup>3</sup> )	TWA 200 ppm (790 mg/m <sup>3</sup> )	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 <sup>3</sup> )	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 <sup>3</sup> )	TWA 25 ppm (125 mg/m <sup>3</sup> )	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 <sup>3</sup> )	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 <sup>3</sup> ) STEL 300 ppm (885 mg/m <sup>3</sup> )	TWA 200 ppm (590 mg/m <sup>3</sup> ) STEL 300 ppm (885 mg/m <sup>3</sup> )	TWA 200 ppm (590 mg/m <sup>3</sup> )	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 <sup>3</sup> )	TWA 1000 ppm (2400 mg/m <sup>3</sup> )	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 <sup>3</sup>	Ca TWA 0.1 mg/m <sup>3</sup> (cyclohexane-extractable fraction)	TWA 0.2 mg/m <sup>3</sup> (benzene-soluble fraction)	Ca [80 mg/m <sup>3</sup> ]	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 <sup>3</sup>	TWA 0.5 mg/m <sup>3</sup>	TWA 0.5 mg/m <sup>3</sup>	50 mg/m <sup>3</sup> (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 <sup>3</sup>	Ca C 0.002 mg/m <sup>3</sup> [15-min]	TWA 0.010 mg/m <sup>3</sup>	Ca [5 mg/m <sup>3</sup> (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: sublimates
Asbestos	1332-21-4	TWA 0.1 f/cc	Ca 100,000 fibers/m <sup>3</sup>	TWA 0.1 fiber/cm <sup>3</sup>	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 <sup>3</sup> (fumes)	Ca C 5 mg/m <sup>3</sup> [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 <sup>3</sup>	None established	TWA 0.5 mg/m <sup>3</sup>	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 <sup>3</sup>	TWA 0.2 mg/m <sup>3</sup>	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 <sup>3</sup>	TWA 0.2 mg/m <sup>3</sup>	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 <sup>3</sup>	Ca C 0.0005 mg/m <sup>3</sup>	TWA 0.002 mg/m <sup>3</sup> C 0.005 mg/m <sup>3</sup> (30 minutes) with a maximum peak of 0.025 mg/m <sup>3</sup>	Ca [4 mg/m <sup>3</sup> (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 <sup>3</sup>	TWA 5 mg/m <sup>3</sup> STEL 10 mg/m <sup>3</sup> (do not exceed during andy 15-minute work period)	TWA 5 mg/m <sup>3</sup>	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 <sup>3</sup> )	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 <sup>3</sup>	Ca	TWA 0.005 mg/m <sup>3</sup>	Ca [9 mg/m <sup>3</sup> (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 <sup>3</sup> ) STEL 10 ppm (30 mg/m <sup>3</sup> ) [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, eyes, 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 <sup>3</sup> )	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 <sup>3</sup> )	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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Chloroform	67-66-3	TWA 10 ppm	Ca STEL 2 ppm (9.78 mg/m <sup>3</sup> ) [60-minute]	C 50 ppm (240 mg/m <sup>3</sup> )	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 <sup>3</sup> (metal and Cr III compounds) TWA 0.05 mg/m <sup>3</sup> (water-soluble Cr IV compounds) TWA 0.01 mg/m <sup>3</sup> (insoluble Cr IV compounds)	TWA 0.5 mg/m <sup>3</sup>	TWA 1 mg/m <sup>3</sup>	250 mg/m <sup>3</sup> (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 <sup>3</sup>	Ca TWA 0.1 mg/m <sup>3</sup> (cyclohexane-extractable fraction)	TWA 0.2 mg/m <sup>3</sup> (benzene-soluble fraction)	Ca [80 mg/m <sup>3</sup> ]	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 F.P.: 4 C UEL: 12.8% LEL: 9.7 %
Copper	7440-50-8	TWA 0.2mg/m <sup>3</sup> (fume) 1 mg/m <sup>3</sup> (dusts and mists)	TWA 1 mg/m <sup>3</sup>	TWA 1 mg/m <sup>3</sup>	100 mg/m <sup>3</sup> (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 F.L.P: 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 <sup>3</sup> ) STEL 125 ppm (545 mg/m <sup>3</sup> )	TWA 100 ppm (435 mg/m <sup>3</sup> )	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 F.L.P: 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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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 <sup>3</sup> (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 Fl.Pt = -45°F LEL = 1.4% UEL = 7.6% Classs 1B Flammable Liquid
Hexachlorobutadiene	87-68-3	TWA 0.02 ppm	Ca TWA 0.02 ppm (0.24 mg/m <sup>3</sup> ) [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 <sup>3</sup> ) [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; impariment 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; impariment of blood forming tissue	Skin	Yellowish crystal solid BP: 536 C
Isopropylbenzene	98-82-8	TWA 50 ppm	TWA 50 ppm (245 mg/m <sup>3</sup> ) [skin]	TWA 50 ppm (245 mg/m <sup>3</sup> ) [skin]	900 ppm [10%LEL]	inhalation, skin absorption, ingestion, skin and/or eye contact	Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma	Eyes, skin, respiratory system, central nervous system	Colorless liquid with a sharp, penetrating, aromatic odor. BP: 306°F Fl.P: 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 <sup>3</sup>	TWA (8-hour) 0.050 mg/m <sup>3</sup>	TWA 0.050 mg/m <sup>3</sup>	100 mg/m <sup>3</sup> (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 <sup>3</sup>	TWA 1 mg/m <sup>3</sup> STEL 3 mg/m <sup>3</sup>	C 5 mg/m <sup>3</sup>	500 mg/m <sup>3</sup> (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 <sup>3</sup> STEL 0.03 mg/m <sup>3</sup> [skin]	TWA 0.01 mg/m <sup>3</sup> STEL 0.03 mg/m <sup>3</sup> [skin]	TWA 0.01 mg/m <sup>3</sup> C 0.04 mg/m <sup>3</sup>	2 mg/m <sup>3</sup> (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 <sup>3</sup> (elemental and inorganic forms)	Hg Vapor: TWA 0.05 mg/m <sup>3</sup> [skin] Other: C 0.1 mg/m <sup>3</sup> [skin]	TWA 0.1 mg/m <sup>3</sup>	10 mg/m <sup>3</sup> (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 - suspected human carcinogen	Ca	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 <sup>3</sup> ) STEL 15 ppm (75 mg/m <sup>3</sup> )	TWA 10 ppm (50 mg/m <sup>3</sup> )	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 <sup>3</sup> (elemental) TWA 0.1 mg/m <sup>3</sup> (soluble inorganic compounds) TWA 0.2 mg/m <sup>3</sup> (insoluble inorganic compounds) TWA 0.1 mg/m <sup>3</sup> (Nickel subsulfide)	Ca TWA 0.015 mg/m <sup>3</sup>	TWA 1 mg/m <sup>3</sup>	Ca [10 mg/m <sup>3</sup> (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 <sup>3</sup> ) [skin]	TWA 1 ppm (5 mg/m <sup>3</sup> ) [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 <sup>3</sup> C 1800 mg/m <sup>3</sup> [15 min]	TWA 500 ppm (2000 mg/m <sup>3</sup> )	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 <sup>3</sup> ) C 15.6 ppm (60 mg/m <sup>3</sup> ) [15-minute] [skin]	TWA 5 ppm (19 mg/m <sup>3</sup> ) [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 <sup>3</sup>	TWA 0.2 mg/m <sup>3</sup>	TWA 0.2 mg/m <sup>3</sup>	1 mg/m <sup>3</sup> (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 <sup>3</sup> (metal, dust, fumes) TWA 0.01 mg/m <sup>3</sup> (Soluble compounds, as Ag)	TWA 0.01 mg/m <sup>3</sup>	TWA 0.01 mg/m <sup>3</sup>	10 mg/m <sup>3</sup> (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 <sup>3</sup> ) STEL 150 ppm (560 mg/m <sup>3</sup> )	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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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 <sup>3</sup> ) STEL 150 ppm	TWA 100 ppm (435 mg/m <sup>3</sup> )	TWA 100 ppm (435 mg/m <sup>3</sup> )	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 <sup>3</sup> (Inhalable fraction)	None established	TWA 10 mg/m <sup>3</sup> (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

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Guide to Occupational Exposure Values. 2008. American Conference of Governmental Industrial Hygienists (ACGIH).  
NIOSH Pocket Guide to Chemical Hazards. 2005. Department of Health and Human Services, Centers for Disease Control and Prevention,  
National Institute for Occupational Safety and Health.

**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/m<sup>3</sup> – 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**

<b>Instrument</b>	<b>Action Level *</b>	<b>Level of Respiratory Protection/Action</b>
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.

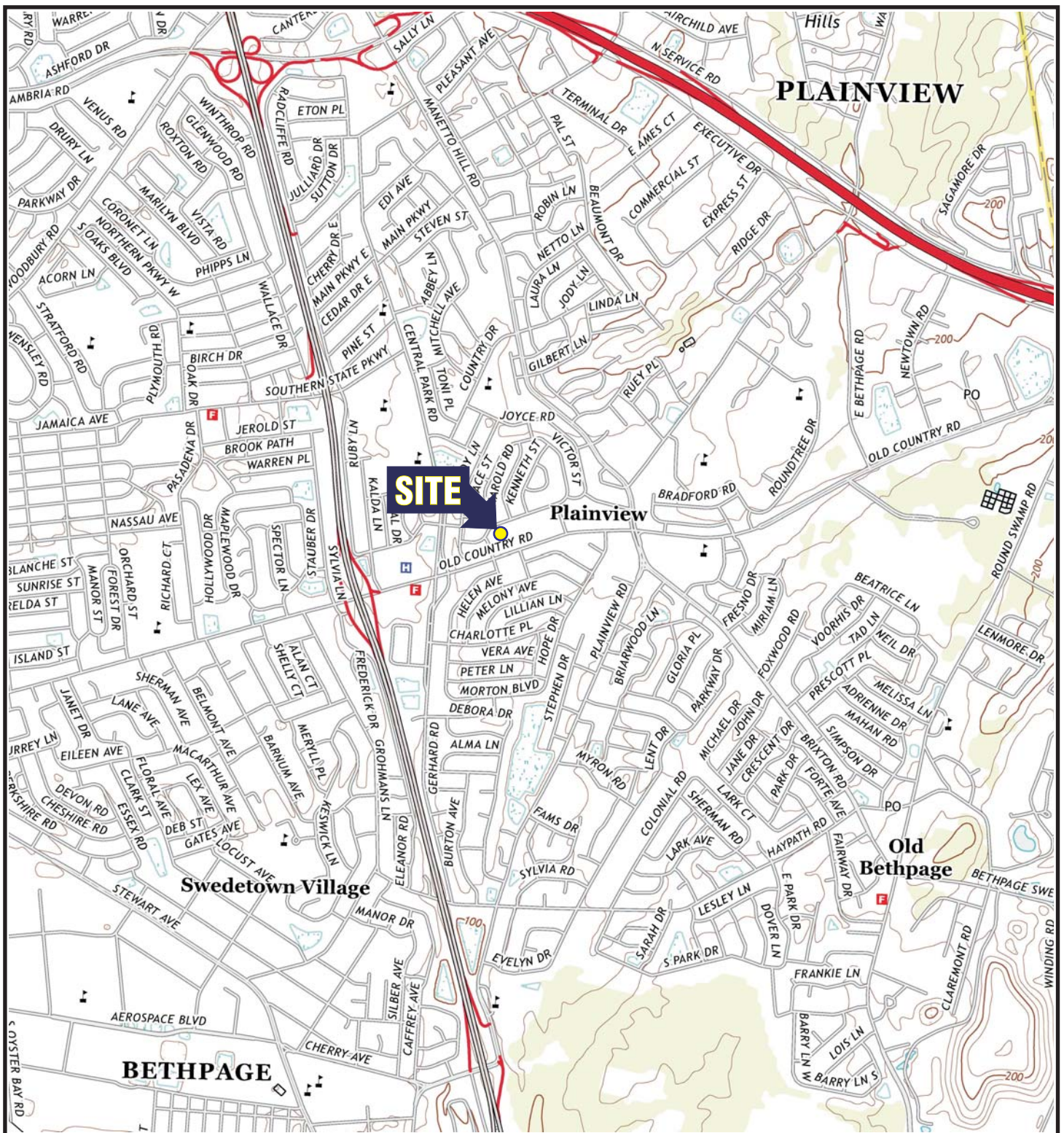
\* Instrument readings will be taken in the breathing zone of the workers, unless otherwise indicated.

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

**FIGURES**

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



0 2000'

Title:

## SITE LOCATION MAP

1022 OLD COUNTRY ROAD  
PLAINVIEW, NEW YORK

Prepared for:

MORTON VILLAGE REALTY CO., INC



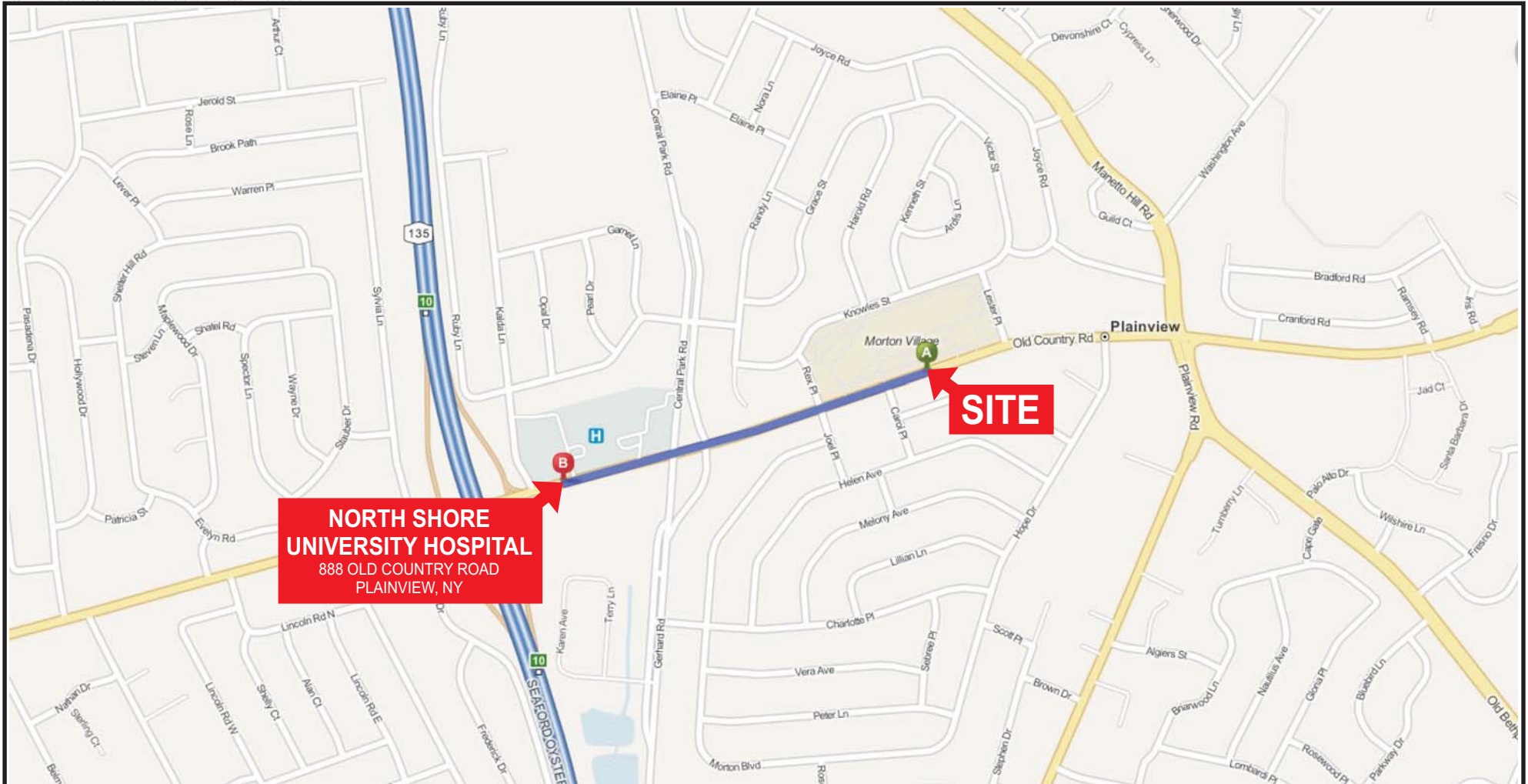
ROUX ASSOCIATES, INC.  
Environmental Consulting  
& Management

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





Title:

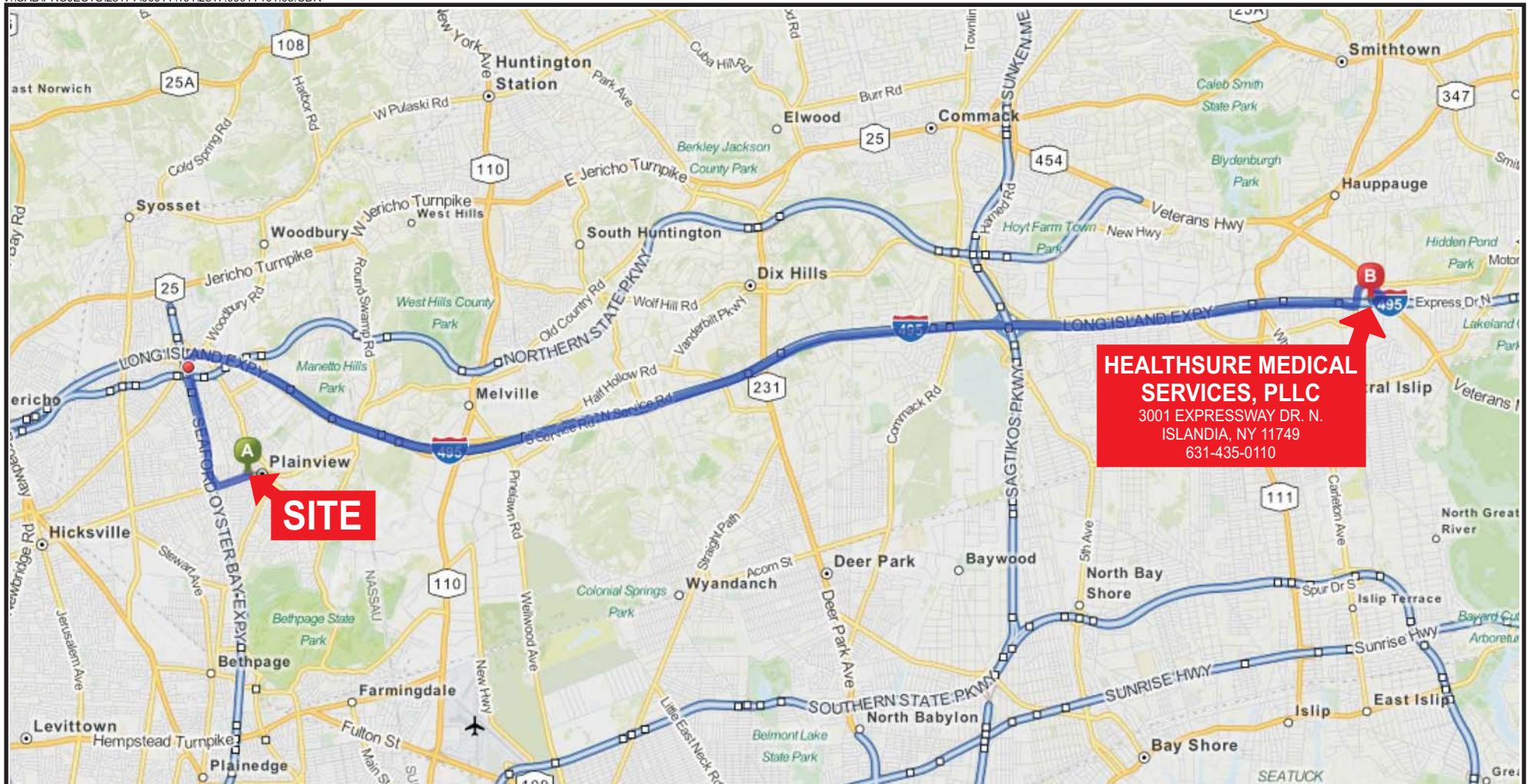
**HOSPITAL ROUTE  
MORTON VILLAGE PLAZA PROJECT**

1022 OLD COUNTRY ROAD  
PLAINVIEW, NEW YORK

Prepared for:

**MORTON VILLAGE REALTY CO., INC**

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



### 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)



0 5000 ft

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.  
Environmental Consulting  
& Management

Compiled by: J.W.

Prepared by: J.A.D.

Project Mgr.: J.W.

File: 2517.0001Y101.03.CDR

Date: 13JAN15

Scale: AS SHOWN

Project No.: 2517.0001Y000

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.

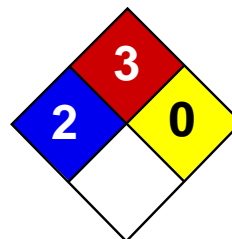


The *Occupational Safety and Health Act of 1970 (OSH Act)*, P.L. 91-596, assures safe and healthful working conditions for working men and women throughout the Nation. The Occupational Safety and Health Administration, in the U.S. Department of Labor, has the primary responsibility for administering 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](http://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](http://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:** C<sub>6</sub>H<sub>6</sub>

#### 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](http://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, CO<sub>2</sub>).

**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. Virgorous 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(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

*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.*



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-Dichloroethy ylene	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.  
Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a  
Respirators: 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: C<sub>2</sub>H<sub>2</sub>Cl<sub>2</sub>

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

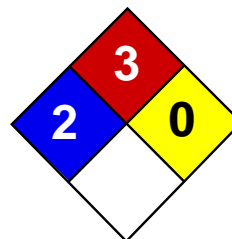
MSDS Creation Date: 2/09/1998

Revision #6 Date 7/20/2009

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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:** C<sub>8</sub>H<sub>10</sub>

#### 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](http://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/m<sup>3</sup>) 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:**

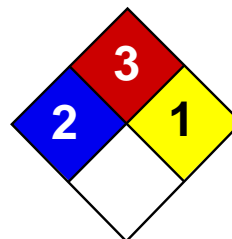
-Manufacturer's Material Safety Data Sheet. -Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA) -Registry of Toxic Effects of Chemical Substances (RTECS) -Chemical Hazard Response Information System (CHRIS) -Hazardous Substance Data Bank (HSDB) -New Jersey 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:** C<sub>6</sub>H<sub>5</sub>CH(CH<sub>3</sub>)<sub>2</sub>

#### 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](http://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, CO<sub>2</sub>).

**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/m<sup>3</sup>) 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

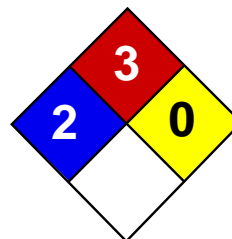
**References:** Not available.

**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:** C<sub>5</sub>H<sub>12</sub>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](http://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 (LD<sub>50</sub>): Acute: 4000 mg/kg [Rat]. 5960 mg/kg [Mouse]. VAPOR (LC<sub>50</sub>): 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, CO<sub>2</sub>).

**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.

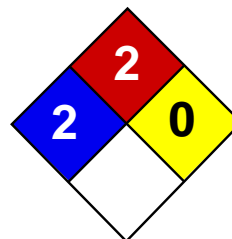
**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:23 PM

**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:** C<sub>10</sub>H<sub>8</sub>

**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](http://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, CO<sub>2</sub>).

**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) TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [1995] TWA: 52 STEL: 79 (mg/m<sup>3</sup>) 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.

**Created:** 10/11/2005 01:30 PM

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

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# MATERIAL SAFETY DATA SHEET

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## 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

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## 2. COMPOSITION, INFORMATION ON INGREDIENTS

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**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

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**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.

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## 5. FIRE FIGHTING MEASURES

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**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

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**STORAGE:** Store and handle in accordance with all current regulations and standards.

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## 8. EXPOSURE CONTROLS, PERSONAL PROTECTION

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### **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.

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## 9. PHYSICAL AND CHEMICAL PROPERTIES

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**PHYSICAL STATE:** liquid

**COLOR:** colorless

**ODOR:** odorless

**MOLECULAR WEIGHT:** 134.21

**MOLECULAR FORMULA:** C<sub>10</sub>-H<sub>14</sub>

**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

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## 10. STABILITY AND REACTIVITY

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**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.

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## 11. TOXICOLOGICAL INFORMATION

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**BUTYL BENZENE:**

**LOCAL EFFECTS:**

Irritant: inhalation, skin, eye

**TARGET ORGANS:** central nervous system

---

## 12. ECOLOGICAL INFORMATION

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**ECOTOXICITY DATA:**

**INVERTEBRATE TOXICITY:** 340 ug/L 48 hour(s) EC50 (Immobilization) Water flea (Daphnia magna)

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## 13. DISPOSAL CONSIDERATIONS

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Dispose in accordance with all applicable regulations.

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## 14. TRANSPORT INFORMATION

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**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

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## 15. REGULATORY INFORMATION

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**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/NDL):** Not determined.

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**16. OTHER INFORMATION**

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# Material Safety Data Sheet

HAZARD WARNINGS	RISK PHRASES	PROTECTIVE CLOTHING
	<b>Combustible material; avoid heat and sources of ignition.</b> <b>The health risks of this compound have not been fully determined.</b> <b>Exposure may cause irritation of the skin, eyes, and respiratory system.</b>	   

## Section I. Chemical Product and Company Identification

Chemical Name	<b>n-Propylbenzene</b>		
Catalog Number	P0523	Supplier	TCI America 9211 N. Harborside St. Portland OR 1-800-423-8616
Synonym	1-Phenylpropane		
Chemical Formula	CH <sub>3</sub> CH <sub>2</sub> CH <sub>2</sub> C <sub>6</sub> H <sub>5</sub>		
CAS Number	103-65-1		
		In case of Emergency Call	<b>Chemtrec®</b> <b>(800) 424-9300 (U.S.)</b> <b>(703) 527-3887 (International)</b>

## 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 <sub>50</sub> (inhalation) 65000ppm/2H Rat LD <sub>50</sub> (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	<b>CARCINOGENIC EFFECTS</b> : Not available. <b>MUTAGENIC EFFECTS</b> : Not available. <b>TERATOGENIC EFFECTS</b> : Not available. <b>DEVELOPMENTAL TOXICITY</b> : Not available. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

## 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 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. 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 <sub>2</sub> ).		
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, CO<sub>2</sub>, 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<sub>50</sub> (inhalation) 65000ppm/2H  
Rat LD<sub>50</sub> (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.

**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).

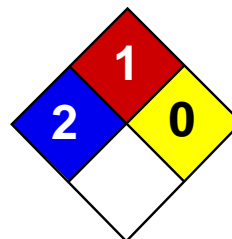
EINECS Number (EEC) 203-132-9

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:** C<sub>14</sub>H<sub>10</sub>

#### 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](http://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, CO<sub>2</sub>).

**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

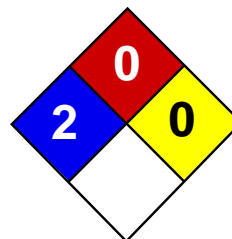
**References:** Not available.

**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; Tetralex; Tetravec; Tetrogue; Tetropil

**Chemical Name:** Ethylene, tetrachloro-

**Chemical Formula:** C<sub>2</sub>-Cl<sub>4</sub>

#### 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](http://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 (LD<sub>50</sub>): Acute: 2629 mg/kg [Rat]. DERMAL (LD): Acute: >3228 mg/kg [Rabbit]. MIST(LC<sub>50</sub>): Acute: 34200 mg/m 8 hours [Rat]. VAPOR (LC<sub>50</sub>): 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):**

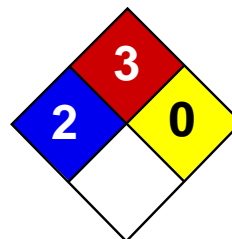
R40- Possible risks of irreversible effects. R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. S23- Do not breathe gas/fumes/vapour/spray S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S37- Wear suitable 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:** C<sub>6</sub>H<sub>5</sub>-CH<sub>3</sub> or C<sub>7</sub>H<sub>8</sub>

#### 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](http://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, CO<sub>2</sub>).

**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; N<sub>2</sub>O<sub>4</sub>; AgClO<sub>4</sub>; BrF<sub>3</sub>; 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/m<sup>3</sup>) 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(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.

**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 08:30 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.*



# 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

Part of Thermo Fisher Scientific

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

**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.

**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/m<sup>3</sup> TWA

### 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 (CCl<sub>4</sub>=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:** C<sub>2</sub>HCl<sub>3</sub>

**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

**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/m<sup>3</sup>/20M;  
Inhalation, mouse: LC50 = 262000 mg/m<sup>3</sup>/30M;  
Inhalation, mouse: LC50 = 40000 mg/m<sup>3</sup>/4H;  
Inhalation, rat: LC50 = 140700 mg/m<sup>3</sup>/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
<b>Shipping Name:</b>	TRICHLOROETHYLENE	TRICHLOROETHYLENE
<b>Hazard Class:</b>	6.1	6.1
<b>UN Number:</b>	UN1710	UN1710
<b>Packing Group:</b>	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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+91-22-6680 3001 / 02 fax

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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

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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/m3 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.

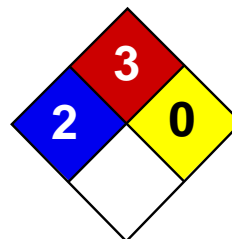
## Section 16 - Other Information

**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:** C<sub>6</sub>H<sub>4</sub>(CH<sub>3</sub>)<sub>2</sub>

#### 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](http://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, CO<sub>2</sub>).

**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/m<sup>3</sup>) [Canada] TWA: 434 STEL: 651 (mg/m<sup>3</sup>) 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

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## **Job Safety Analysis**

<b>JOB SAFETY ANALYSIS</b>		Ctrl. No. generic	DATE: 9/14/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY <b>Generic</b>		WORK TYPE: <b>Drilling</b>		WORK ACTIVITY (Description): <b>Soil Vapor Point Installation by Hand</b>	
<b>DEVELOPMENT TEAM</b>		<b>POSITION / TITLE</b>		<b>REVIEWED BY:</b>	
Jeffrey Wills		Project Hydrogeologist		Daniel Abberton	
Chris Migliorie		Driller (ADT)		Dennis Mayer	
				Operations Mgr. (ADT)	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<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 and jack hammering) <input checked="" type="checkbox"/> HEARING PROTECTION: (as needed) <input checked="" type="checkbox"/> SAFETY SHOES steel or composite toe		<input type="checkbox"/> AIR PURIFYING RESPIRATOR <input type="checkbox"/> SUPPLIED RESPIRATOR <input checked="" type="checkbox"/> PPE CLOTHING: fluorescent long sleeve shirt or long sleeve shirt and reflective safety vest.	
				<input checked="" type="checkbox"/> GLOVES: <u>Leather, Nitrile and Cut Resistant ANSI Level 2</u> <input checked="" type="checkbox"/> OTHER: <u>Insect Repellent, sunscreen (as needed)</u>	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
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.					
<b>EXCLUSION ZONE POLICY:</b> All non-essential personnel will maintain a 10' exclusion zone during any invasive work					
<b>"SHOW ME YOUR HANDS"</b>					
<b>Driller and helper should show that hands are clear from controls and moving parts</b>					
<b>Assess 1JOB STEPS</b>		<b>Analyze 2POTENTIAL HAZARDS</b>		<b>Act 3CRITICAL ACTIONS</b>	
1. Verify pre-clearance protocol and Subsurface Clearance Procedure Checklist		1a. <b>CONTACT:</b> 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 ( <b>see Site Walk Inspection JSA</b> ). 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. <b>FALL:</b> tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the Site  2b. <b>CONTACT:</b> 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. <b>Maintain 10 foot exclusion zone</b> 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.	
<b>Assess 1JOB STEPS</b>		<b>Analyze 2POTENTIAL HAZARDS</b>		<b>Act 3CRITICAL ACTIONS</b>	
		2c. <b>EXERTION:</b> 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.	

<sup>1</sup> Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.

<sup>2</sup> A hazard is a potential danger. Break hazards into six types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

	<p>2d. <b>EXPOSURE:</b> 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. <b>EXPOSURE:</b> Sun possibly causing sunburn or cold possibly causing cold stress</p> <p>2f. <b>EXPOSURE:</b> 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. <b>See Clearing, Vactron and Air Knife JSAs</b>	3a. <b>See Clearing, Vactron and Air Knife JSA.</b>
4. Soil vapor point installation	<p>4a. <b>CAUGHT:</b> Pinch points associated with equipment and installation</p> <p>4b. <b>EXERTION:</b> 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. <b>EXPOSURE/CONTACT:</b> Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, soil)</p> <p>5b. <b>EXERTION:</b> Muscle strain</p> <p>5c. <b>CAUGHT:</b> Pinch points associated with handling drum lid</p> <p>5d. <b>FALL:</b> 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. <b>EXPOSURE/CONTACT:</b> Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors)</p> <p>6b. <b>EXPOSURE:</b> 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>

<sup>1</sup> Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.

<sup>2</sup> A hazard is a potential danger. Break hazards into six types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

<b>JOB SAFETY ANALYSIS</b>		Ctrl. No. GEN-004	DATE 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: <b>Generic</b>	WORK TYPE: <b>Drilling</b>	WORK ACTIVITY (Description): <b>Direct Push Soil Borings / Well Installation</b>			
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>		
Jeffrey Wills	Project Hydrogeologist	Ray Fitzpatrick	OHSO		
Thalassa Sodre	Staff Assistant Engineer				
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<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>		
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
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					
<b>Exclusion Zone Policy</b> – All non-essential personnel will maintain a distance of 10' feet from drilling equipment while moving/engaged.					
<b>"SHOW ME YOUR HANDS"</b>					
Driller and helper should show that hands are clear from controls and moving parts					
<b>Assess</b> <b><sup>1</sup>JOB STEPS</b>	<b>Analyze</b> <b><sup>2</sup>POTENTIAL HAZARDS</b>	<b>Act</b> <b><sup>3</sup>CRITICAL ACTIONS</b>			
1. Mobilization of drilling rig (ensure the Subsurface Clearance Protocol and Drill Rig Checklist are completed)	1a. <b>CONTACT:</b> Equipment/property damage.  1b. <b>FALL:</b> 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 <b>exclusion zone of 10 feet</b> 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. <b>CONTACT:</b> Overhead hazards.  2b. <b>CONTACT:</b> 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. <b>CONTACT:</b> Flying debris	3a. Be aware of and avoid potential lines of fire and wear required PPE such as eye, ear, and hand protection.			

<sup>1</sup> Each Job or Operation consists of a set of tasks / steps. Be sure to list all the steps needed to perform job.

<sup>2</sup> A hazard is a potential danger. Break hazards into five types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

<p>3. Advancement of drilling equipment and well installation (Continued)</p>	<p>3b. <b>EXPOSURE:</b> Noise and dust.</p> <p>3c. <b>CAUGHT:</b> Limb/extremity pinching; abrasion/crushing.</p> <p>3d. <b>CONTACT:</b> Equipment imbalance during advancement of drill equipment.</p> <p>3e. <b>EXPOSURE:</b> Inhalation of contamination/vapors.</p> <p>3f. <b>FALL:</b> Slip/trip/fall hazards.</p> <p>3g. <b>EXERTION:</b> 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 <b>exclusion zone of 10 feet</b> 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 (<b>minimum exclusion zone of 10 feet</b>).</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 &gt;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. <b>EXPOSURE/CONTACT:</b> To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).</p> <p>4b. <b>EXPOSURE:</b> 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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<sup>2</sup> A hazard is a potential danger. Break hazards into five types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source – electricity, pressure, compression/tension.

<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

<b>JOB SAFETY ANALYSIS</b>		<b>Ctrl. No. GEN-007</b>	DATE: 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 1
<b>JSA TYPE CATEGORY</b> <b>GENERIC</b>		<b>WORK TYPE</b> <b>Drilling</b>		<b>WORK ACTIVITY (Description)</b> <b>Movement of 55-gallon Drums/Drum Handling</b>	
<b>DEVELOPMENT TEAM</b>		<b>POSITION / TITLE</b>		<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>
Thalassa Sodre		Staff Assistant Engineer		Jeff Wills	Project Manager
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<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:	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Required Equipment: Drum Cart and/or forklift, safety cones, and caution tape					
<b>EXCLUSION ZONE: A 10' exclusion zone will be maintained around forklift.</b>					
<b>Assess 1JOB STEPS</b>		<b>Analyze 2POTENTIAL HAZARDS</b>		<b>Act 3CRITICAL ACTIONS</b>	
1. Secure Work Area, Inspect 55-gal drums for proper condition, labeling, check drum ring and bolts.		1a. <b>FALL:</b> Tripping/falling due to uneven surface terrain.  1b. <b>EXPOSURE:</b> Drums could potentially be damaged and contain hazardous material.  1c. <b>OVEREXERTION:</b> 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. <b>CAUGHT/CONTACT:</b> Hazards between drum/forklift clamp or dolly fastener/drum.  2b. <b>OVEREXERTION/CONTACT:</b> 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. <b>EXPOSURE/ CONTACT:</b> Hazards associated with drum transport; skin contact and vapors.  3b. <b>CAUGHT:</b> Pinching hazards associated with maneuvering drums.  3c. <b>FALL:</b> Tripping/ falling due to obstructions and uneven terrain.		3a. <b>Maintain a 10' EZ around forklift.</b> 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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<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift." Avoid general statements such as, "be careful."



<b>JSA SAFETY ANALYSIS</b>		<b>Ctrl. No. GEN-006</b>	DATE 1/15/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY <b>Generic</b>		WORK TYPE <b>Surveying</b>		WORK ACTIVITY (Description) <b>Elevation Surveying</b>	
<b>DEVELOPMENT TEAM</b>		<b>POSITION / TITLE</b>		<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>
Bjorn Wespestad		Project Engineer		Jeff Wills	Project Manager
Thalassa Sodre		Staff Assistant Engineer			
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<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	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Surveying equipment (i.e., leveling rod/measuring ruler, tripod and scope).					
<b>Assess 1JOB STEPS</b>		<b>Analyze 2POTENTIAL HAZARDS</b>		<b>Act 3CRITICAL ACTIONS</b>	
1. Locate surveying position for instrument and rod and set-up work area		1a. <b>FALL:</b> Slip/trip hazards.  1b. <b>CONTACT:</b> Traffic (surveying locations could potentially be located in parking areas and sidewalks).  1c. <b>OVEREXERTION:</b> Hazard due to carrying, lifting, and bending while transporting equipment.  1d. <b>CAUGHT/CONTACT:</b> 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. <b>OVEREXERTION:</b> Muscle strain  2b. <b>CAUGHT:</b> Pinch points associated with removing / replacing manholes and working with hand tools.  2c. <b>EXPOSURE:</b> To potentially hazardous vapors.  2d. <b>CONTACT:</b> 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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<sup>2</sup> A hazard is a potential danger. Break hazards into five types: Contact - victim is struck by or strikes an object; Caught - victim is caught on, caught in or caught between objects; Fall - victim falls to ground or lower level (includes slips and trips); Exertion - excessive strain or stress / ergonomics / lifting techniques; Exposure - inhalation/skin hazards; Energy Source - electricity, pressure, compression/tension.

<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
3. Perform survey.	3a. <b>FALL:</b> Slip/trip hazards  3b. <b>CONTACT:</b> 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. <b>CONTACT:</b> Traffic (surveying locations can potentially be located in parking areas and sidewalks).  4b. <b>EXERTION:</b> Hazard due to carrying, lifting, and bending while transporting equipment	4a. See 1b.  4b. See 1c.

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<b>JOB SAFETY ANALYSIS Ctrl. No. GEN-005</b>		DATE 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY <b>Generic</b>		WORK TYPE: <b>Gauging and Sampling</b>		
WORK ACTIVITY (Description): <b>Gauging and Sampling</b>				
<b>DEVELOPMENT TEAM</b>		<b>POSITION / TITLE</b>		<b>REVIEWED BY:</b>
Gina Masciello		Project Scientist		Jeff Wills
Thalassa Sodre		Staff Assistant Engineer		
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>				
<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>
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>				
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.				
<b>Assess 1JOB STEPS</b>		<b>Analyze 2POTENTIAL HAZARDS</b>		<b>Act 3CRITICAL ACTIONS</b>
1. Mobilization to monitoring well(s).		1a. <b>FALL:</b> Personal injury from slip/trip/fall due to uneven terrain and/or obstructions.  1b. <b>CONTACT:</b> With traffic/third parties.  1c. <b>EXPOSURE:</b> 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. <b>OVEREXERTION:</b> Muscle strain.  2b. <b>CAUGHT:</b> Pinch points associated with removing/replacing manholes and working with hand tools.  2c. <b>EXPOSURE:</b> 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. <b>CONTACT:</b> With contamination (e.g. contaminated groundwater).  3b. <b>CONTACT:</b> 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. <b>EXPOSURE/CONTACT:</b> 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.
<b>Assess 1JOB STEPS</b>		<b>Analyze 2POTENTIAL HAZARDS</b>		<b>Act 3CRITICAL ACTIONS</b>

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<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

<p>4. Purge and sample well (Continued).</p>	<p>4b. <b>CONTACT:</b> Personal injury from cuts, abrasions, or punctures by glassware or sharp objects.</p> <p>4c. <b>EXERTION:</b> Muscle strain while carrying equipment.</p> <p>4d. <b>CONTACT:</b> 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. <b>EXPOSURE/CONTACT:</b> To contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>5b. <b>EXERTION:</b> 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. <b>EXPOSURE/CONTACT:</b> 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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<b>JOB SAFETY ANALYSIS</b>		Ctrl. No.	DATE 1/12/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: <b>Site Specific</b> <b>Site: Morton Village</b>		WORK TYPE: <b>Drilling</b>	WORK ACTIVITY (Description): <b>Hollow Stem Auger Soil Borings /Well Installation</b>		
<b>DEVELOPMENT TEAM</b>		<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
Dennis Mayer		Operations Manager	Jeff Wills	Project Manager	
Gina Vanderlin		Project Scientist			
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<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>	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
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					
<b>EXCLUSION ZONE POLICY – All non-essential personnel shall maintain a 20 foot exclusion zone while drill rig is engaged</b>					
<b>"SHOW ME YOUR HANDS"</b>					
<b>Driller and helper should show that hands are clear from controls and moving parts</b>					
<b>Assess 1JOB STEPS</b>	<b>Analyze 2POTENTIAL HAZARDS</b>	<b>Act 3CRITICAL ACTIONS</b>			
1. Mobilization / demobilization and establish a work area	1a. <b>See Mobilization/ Demobilization</b>	1a. See Mobilization/ Demobilization JSA			
2. Raising tower/derrick of drilling rig	2a. <b>CONTACT:</b> Overhead hazards.  2b. <b>CONTACT:</b> 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. <b>CONTACT:</b> Flying / spraying debris.  3b. <b>EXPOSURE:</b> 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. <b>CAUGHT:</b> Limb/extremity amputation; abrasion/crushing.</p> <p>4d. <b>CONTACT:</b> 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. <b>EXPOSURE:</b> Inhalation of contamination/vapors.</p> <p>4f. <b>FALL:</b> Slip/trip/fall hazards.</p> <p>4g. <b>EXERTION:</b> 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 <b>exclusion zone of 20 feet</b> 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 (<b>minimum exclusion zone of 20 feet</b>).</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 &gt;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. <b>CONTACT:</b> 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. <b>EXPOSURE/CONTACT:</b> To contamination (e.g., contaminated groundwater, vapors).</p> <p>6b. <b>EXPOSURE:</b> 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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<b>JOB SAFETY ANALYSIS</b>		<b>Cntrl. No. GEN-010</b>	DATE: 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
<b>JSA TYPE CATEGORY</b> <b>GENERIC</b>		<b>WORK TYPE</b> <b>Site Recon</b>	<b>WORK ACTIVITY (Description)</b> <b>Mobilization/Demobilization</b>		
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>		<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
Jared Lefkowitz	Staff Assistant Scientist		Ray Fitzpatrick	OSHO	
Jeff Wills	Project Hydrogeologist				
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<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	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Required Equipment:					
<b>EXCLUSION ZONE: A minimum exclusion zone of 10' will be maintained around moving equipment (if necessary)</b>					
<b>Assess</b> <b>1<sup>1</sup>JOB STEPS</b>	<b>Analyze</b> <b>2<sup>2</sup>POTENTIAL HAZARDS</b>		<b>Act</b> <b>3<sup>3</sup>CRITICAL ACTIONS</b>		
1. Mobilize/demobilize and establish work area	<b>1a. FALL:</b> Slip/trips/falls from obstructions, uneven terrain, weather conditions, heavy loads, and/or poor housekeeping.  <b>1b. CONTACT:</b> Personal injury and/or property damage caused by being struck by Site traffic or equipment used in Site activities.  <b>1c. CAUGHT:</b> Personal injury from pinch points and being in line-of-fire of vehicle and/or equipment.		1a. Use 3 points-of-contact/ensure secure footing when entering and exiting vehicle. 1a. Inspect walking path for uneven terrain, steep hills, obstructions, and/or weather-related hazards (i.e., ice, snow, and puddles) prior to mobilizing equipment. Use established pathways. Walk on stable/secure ground. 1a. Do not climb over stored materials/equipment; walk around. Practice good housekeeping. 1a. Wear boots with adequate treads. 1a. Delineate unsafe areas with 42" cones, caution tape and/or flagging.  1b. Observe and maintain the posted speed limits. 1b. When first arriving onsite, park vehicles in designated parking space and/or out of the way locations. Use parking brake on all vehicles and tire chocks on work trucks and trailers. 1b. Check in with Site Manager/Supervisor to ensure coordination with other Site activities. 1b. Identify potential traffic sources. 1b. Wear PPE including high visibility clothing or reflective vest. 1b. Use a spotter while moving work vehicles; plan ahead to avoid backing when unnecessary. 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. 1b. Delineate work area with 42" cones, flags, caution tape, and/or other barriers. 1b. Position "Work Area" signs at Site entrances, if possible, or at either side of work area. 1b. Position largest vehicle to protect against oncoming traffic. 1b. Face traffic, maintain eye contact with oncoming vehicles, use a spotter, and establish a safe exit route.  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. 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. 1c. Keep body parts away from line-of-fire of equipment. 1c. Always carry tools by the handles and/or designated carrier. Ensure sharp-edged tools are sheathed/secure. 1c. Remove any loose jewelry. Ensure loose clothing is secure.		

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Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
	<p><b>1d. OVEREXERTION:</b> Muscle strains while lifting/carrying equipment.</p> <p><b>1e. EXPOSURE:</b> Personal injury from exposure to biological and environmental hazards.</p> <p><b>1f. EXPOSURE:</b> Heat and cold related injuries.</p> <p><b>1g. EXPOSURE:</b> 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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<b>JOB SAFETY ANALYSIS</b>		<b>Cntrl. No. GEN-009</b>	DATE: 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
<b>JSA TYPE CATEGORY</b> <b>GENERIC</b>		<b>WORK TYPE</b> <b>Hand Tools</b>		<b>WORK ACTIVITY (Description)</b> <b>Pre-Clearing activities, including Air Knifing and Soil Vacuuming</b>	
<b>DEVELOPMENT TEAM</b>		<b>POSITION / TITLE</b>		<b>REVIEWED BY:</b>	
Jeff Wills		Project Hydrogeologist		Ray Fitzpatrick	
Dennis Mayer		Manager (ADT)		OHSO	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<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>	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
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					
<b>EXCLUSION ZONE: A 10 foot exclusion zone will be maintained around air knife and/or soil vacuum operations.</b>					
<b>Assess 1JOB STEPS</b>		<b>Analyze 2POTENTIAL HAZARDS</b>		<b>Act 3CRITICAL ACTIONS</b>	
1. Verify pre-clearance protocol.		1a. <b>CONTACT:</b> 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 ( <b>See Site Walk Inspection JSA for critical actions</b> ). 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. <b>See Mobilization / Demobilization JSA for potential hazards.</b>		2a. <b>See Mobilization / Demobilization JSA for critical actions.</b>	
3. Pre-clear with air knife and soil vacuum, and/or clearance with hand tools		3a. <b>CONTACT:</b> Flying debris.  3b. <b>EXPOSURE/ENERGY SOURCE:</b> Inhalation/exposure to hazardous vapors; inhalation/exposure to dust; electrocution.  3c. <b>CONTACT:</b> Damage to unknown/known utility with air knife.  3d. <b>OVEREXERTION:</b> Poor body positioning when handling equipment and materials.		3a. <b>Maintain 10 foot exclusion zone.</b> 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. <b>OVEREXERTION:</b> (continued) Poor body positioning when handling equipment and materials.</p> <p>3e. <b>FALL:</b> Tripping/falling due to uneven terrain, weather conditions, and materials/equipment stored at the Site.</p> <p>3f. <b>CAUGHT:</b> Pinch points associated with the equipment and vacuum hose.</p> <p>3g. <b>EXPOSURE:</b> 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. <b>All non-essential personnel shall maintain a 10 foot exclusion zone;</b> position body out of the line-of-fire of equipment.</p> <p>3f. <b>Drillers and helpers will understand and use the "Show Me Your Hands Policy".</b></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. <b>EXPOSURE/CONTACT:</b> Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, soil).</p> <p>4b. <b>EXERTION:</b> Muscle strain while maneuvering drums with drum cart/lift gate.</p> <p>4c. <b>CAUGHT:</b> 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. <b>EXPOSURE/CONTACT:</b> To contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated groundwater, vapors).</p> <p>5b. <b>EXPOSURE:</b> 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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<b>JOB SAFETY ANALYSIS</b>		<b>Cntrl. No. GEN-012</b>	DATE: 1/5/2015	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: <b>GENERIC</b>		WORK TYPE: <b>Gauging &amp; Sampling</b>	WORK ACTIVITY (Description): <b>Soil Sampling</b>		
<b>DEVELOPMENT TEAM</b>		<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
Jeff Wills		Project Hydrogeologist	Ray Fitzpatrick	OHSM	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<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: Leather, Nitrile and cut resistant <input checked="" type="checkbox"/> OTHER: Insect Repellent, sunscreen (as needed)	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Recommended Equipment; 42" traffic cones, caution tape, trowel					
<b>EXCLUSION ZONE: A minimum 10' exclusion zone will be maintained around moving equipment, if present.</b>					
<b>Assess 1JOB STEPS</b>		<b>Analyze 2POTENTIAL HAZARDS</b>		<b>Act 3CRITICAL ACTIONS</b>	
1. Secure location		1a. <b>CONTACT:</b> Personnel and vehicular traffic may enter the work area.  1b. <b>FALL:</b> Tripping/falling due to uneven terrain or entry/exit from excavations.  1c. <b>EXPOSURE:</b> 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.		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. 1a. Wear reflective vest and/or fluorescent clothing. 1a. Face the direction of any vehicular traffic. Position vehicle to protect worker from traffic. 1a. Communicate work activity with adjacent work areas.  1b. Inspect pathways and work area for uneven terrain, weather-related hazards (i.e., ice, puddles, snow, etc.), and obstructions. 1b. Use established pathways and walk on stable, secure ground. 1b. Stage equipment and tools will in a convenient, stable, and orderly manner. Store equipment at lowest potential energy. 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.  1c. Wear sunscreen with an SPF 15 or greater whenever 30 minutes or more of exposure is expected. 1c. Use a tent to shade the work area from direct sunlight particularly when warm temperatures are also expected. 1c. Be aware of the location of all Site personnel. 1c. Watch for heat stress symptoms (muscle cramping, exhaustion, dizziness, rapid and shallow breathing). 1c. Watch for cold stress symptoms (severe shivering, slowing of body movement, weakness, stumbling or inability to walk, collapse). 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. 1c. No open flames/heat sources. 1c. Flame resistant clothing must be worn when specified by Site policy. 1c. Cell phones should be disabled when specified by Site policy. 1c. Pre-treat field clothing with Permethrin prior to site visit to kill/repel ticks and insects. 1c. Wear long sleeved shirts and tuck in (or tape) pant legs into socks or boots to prevent ticks from reaching skin. 1c. Spray insect repellent containing DEET on exposed skin when working in overgrown areas of the Site. 1c. Inspect area to avoid contact with biological hazards. 1c. Wear cut-resistant gloves when handling branches, shrubs, etc. that may lie within the walking path. 1c. Personnel shall examine themselves and co-worker's outer clothing for ticks periodically when onsite. 1c. If skin comes in contact with poison ivy, wash skin thoroughly with soap and water.	

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<sup>3</sup> Using the first two columns as a guide, decide what actions or procedures are necessary to eliminate or minimize the risk. List the recommended safe operating procedures. Say exactly what needs to be done - such as "use two persons to lift". Avoid general statements such as, "be careful".

Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
2. Collect Soil Sample	<p>2a. <b>CONTACT:</b> 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. <b>EXPOSURE:</b> 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. <b>EXPOSURE/CONTACT:</b> Contamination (e.g., Separate Phase Hydrocarbons (SPH), contaminated vapors and/or soil).</p> <p>3b. <b>EXPOSURE:</b> 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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<b>JOB SAFETY ANALYSIS</b> Cntrl#: GEN-015		DATE 1/15/15	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JSA TYPE CATEGORY: <b>GENERIC</b>	WORK TYPE: <b>Drilling</b>	WORK ACTIVITY (Description): <b>Well Development</b>		
<b>DEVELOPMENT TEAM</b>	<b>POSITION / TITLE</b>	<b>REVIEWED BY:</b>	<b>POSITION / TITLE</b>	
Amy Hoffman	Staff Geologist	Jeff Wills	Project Manager	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>				
<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>	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>				
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.				
<b>Maintain a 20 Foot Exclusion Zone During Development Activities</b>				
<b>"SHOW ME YOUR HANDS"</b> Driller and helper should show that hands are clear from controls and moving parts				
<b>Assess 1JOB STEPS</b>	<b>Analyze 2POTENTIAL HAZARDS</b>	<b>Act 3CRITICAL ACTIONS</b>		
1. Mobilization / Demobilization (Review Mobilization and Demobilization JSA)	1a. <b>CONTACT:</b> Equipment/property damage.  1b. <b>FALL:</b> 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 <b>maintain an exclusion zone of 20 feet.</b> 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. <b>OVEREXERTION:</b> Muscle strain (some wells have large vault covers).  2b. <b>CAUGHT:</b> Pinch points associated with removing/replacing manholes and working with hand tools.  2c. <b>EXPOSURE:</b> Potentially hazardous vapors.  2d. <b>CONTACT:</b> 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 <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
3. Develop well (mechanical surging).	<p>3a. <b>CAUGHT:</b> Cut hazards and finger pinch points.</p> <p>3b. <b>CONTACT/EXPOSURE:</b> Contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>3c. <b>OVEREXERTION:</b> Muscle strain from lifting equipment.</p> <p>3d. <b>CONTACT:</b> 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 <b>maintain an exclusion zone of 20 feet.</b></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 <b>Drill Rig checklist prior to development activities.</b></p> <p>3d. See 3a.</p>
4. Purging well (pumping water to holding tanks/drums/buckets).	<p>4a. <b>CAUGHT:</b> Pinch points associated with connecting hose to tank. Pinch points associated with handling pump and hoses.</p> <p>4b. <b>FALL:</b> Using side mounted ladder when attaching hose to tank.  Slip, trip, fall from lines/hoses</p> <p>4c. <b>CONTACT:</b> Contamination (e.g., SPH, contaminated groundwater).</p> <p>4d. <b>EXERTION:</b> Muscle strain from lifting/carrying equipment.</p> <p>4e. <b>FALL:</b> 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. <b>CONTACT/EXPOSURE:</b> Contamination (e.g., SPH, contaminated groundwater, vapors).</p> <p>5b. <b>EXPOSURE/CONTACT:</b> 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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<b>JOB LOSS ANALYSIS</b>		<b>Ctrl. No. GEN-009</b>	DATE: 1/4/2018	<input type="checkbox"/> NEW <input checked="" type="checkbox"/> REVISED	PAGE 1 of 2
JLA TYPE CATEGORY <b>Generic</b>		WORK TYPE <b>Construction - Excavation</b>		WORK ACTIVITY (Description) <b>Excavation / Trenching</b>	
<b>DEVELOPMENT TEAM</b>		<b>POSITION / TITLE</b>		<b>REVIEWED BY:</b>	
David Kaiser		Project Engineer		Brian Hobbs	
Ian Holst		Project Engineer		Joseph Gentile	
				Senior Health & Safety Manager	
				Corporate Health & Safety Manager	
<b>REQUIRED AND / OR RECOMMENDED PERSONAL PROTECTIVE EQUIPMENT</b>					
<input type="checkbox"/> LIFE VEST <input checked="" type="checkbox"/> HARD HAT <input checked="" type="checkbox"/> LONG SLEEVED SHIRT <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 <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 with long sleeved shirt or high visibility long sleeved clothing</u> <input checked="" type="checkbox"/> GLOVES: <u>Leather or cut resistant</u> <input type="checkbox"/> OTHER	
<b>REQUIRED AND / OR RECOMMENDED EQUIPMENT</b>					
Jackhammer, Excavator, Backhoe, Hand Tools, Photoionization Detector, barrels, 42" traffic cones, snow fencing, telescoping poles, temporary chain link fence, ladders, shovels, digging bars, power tools (cut-off saw), Two-way radios, Sheeting, Trench box, Retractable lanyard, Harness					
<b>COMMITMENT TO LPS-</b> All personnel onsite will actively participate in hazard recognition and mitigation throughout the day by verbalizing LPSAs					
<b>EXCLUSION ZONE (EZ):</b> A 10-foot exclusion zone will be maintained around equipment in motion and outside the swing/tip radius.					
<b>Assess 1JOB STEPS</b>		<b>Analyze 2POTENTIAL HAZARDS</b>		<b>Act 3CRITICAL ACTIONS</b>	
1. Pre-Clearance Protocol.		<b>1a. CONTACT:</b> Damage to underground utility.  <b>1b. ENERGY SOURCE/CONTACT:</b> Property damage; Pressurized water mains may cause lacerations or broken bones. Pressurized gas mains may explode causing serious injury, or death.  Underground electric may cause severe burns, shock, or death.  <b>1c. FALL:</b> Slip, Trip or Fall may cause muscle strains or tears, abrasions, lacerations, or broken bones.		1a. Confirm that (if applicable) "Call Before You Dig" and local utility companies were contacted prior to trenching in order to confirm utility mark outs. Must have a case # before digging.  1b. Pre-clearing of the trenching location must be conducted to a minimum of 5 vertical feet below the ground surface (10 feet minimum for Critical Zone) using hand tools (shovel and non-metallic dig bar) prior to trenching. Supervisor should be contacted to discuss appropriate pre-clearing depth. Complete subsurface clearance checklist.  1c. Be aware of the conditions when walking or loading equipment and working. Walk within established pathway avoiding uneven surfaces. Remove potential slip/trip/fall hazards.	
2. Set up work zone.		<b>2a. CONTACT/CAUGHT:</b> Cuts/lacerations from equipment. Broken bones from contact by vehicle.  <b>2b. FALL:</b> Slip, Trip or Fall may cause muscle strains or tears, abrasions, lacerations, or broken bones.		2a. Isolate work area from hazards with cones, barricades, and snow fencing, telescoping poles or temporary chain link fence. Utilize a flag person when necessary (i.e., third party traffic in area). Install traffic signs in roadways and for detours. Spotters will maintain and enforce exclusion zone.  2b. See 1c.	

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Assess <sup>1</sup> JOB STEPS	Analyze <sup>2</sup> POTENTIAL HAZARDS	Act <sup>3</sup> CRITICAL ACTIONS
3. Trenching Activity.	<p><b>3a. CONTACT:</b> Serious injury including broken bones, muscle strains or tears, and possibly death due to contact with machine.</p> <p><b>3b. FALL:</b> Slip, Trip or Fall may cause muscle strains or tears, abrasions, lacerations, or broken bones</p> <p><b>3c. EXPOSURE:</b> Noise, Dust, Concrete- Asphalt, petroleum hydrocarbon vapors may cause damage to ears and lungs</p>	<p>3a. Spotter(s) required for all heavy equipment operation. No worker shall be allowed inside the exclusion zone or along the trench/excavation area while any equipment is in operation. A minimum exclusion zone greater than the length of the equipment boom must be established. Workers only allowed in exclusion zone if the operator is in "Hands Off" mode. Operator will not operate equipment until worker is out of exclusion zone. Spotters and operators will have radios for communication, when either loses sight of one another, and/or in case of emergency.</p> <p>3b. Any trench/excavation deeper than 3' must have a ladder within 25' of any worker in the excavation. At least 3' (rungs) of the ladder shall be above the top of the excavation. All spoil piles shall be maintained 2' minimum from edge of excavation.</p> <p>3b. Any trench/excavation deeper than 6' must have fall protection, retractable lanyard for ladder use, and 42" high guardrails along the edge of the trench/excavation.</p> <p>3c. Air monitoring using a calibrated photoionization detector (PID) will be used to monitor the breathing zone of the work area. If a reading of &gt;5ppm is recorded, the oversight personnel must temporarily cease work and instruct all Site personnel to step away from the area of elevated readings.</p>
4. Setting Trench protections if necessary.	<p><b>4a. CAUGHT:</b> Injury due to contact with failed trench, may include muscle strains or tears, abrasions or lacerations, broken bones and possibly death.</p> <p><b>4b. CONTACT/CAUGHT:</b> Injury due to rigging activities and entering exclusion zone during lifting and/or transport of shoring/trench box/material may include muscle strains or tears, abrasions or lacerations, broken bones and possibly death.</p> <p><b>4c. FALL:</b> Possible injury due to fall into excavation may include muscle strains or tears, abrasions or lacerations, or broken bones.</p>	<p>4a. To prevent cave-ins and avoid caught by/between, excavations over 4' in depth, unless working in stable rock, shall have engineer approved shoring, sheeting or trench box. Top of protection shall be at least 2' above top of excavation.</p> <p>4b. Use only inspected rigging with 2, 3 or 4 lift points; wear cut-resistant gloves. Rigging to be hooked up to factory installed hook up points on equipment. Control load with non-conductive tag lines with workers out of exclusion zone. Don't stand underneath suspended load; wear steel toed boots and hard hat.</p> <p>4c. Shoring to be set and sides will be backfilled to avoid fall hazards before workers are allowed to enter area. Operator will be in "HANDS OFF" mode before workers enter work area to unhook rigging. An inspected ladder extending 3' above top of the shoring will be used to enter and exit the shoring. Workers will use three points of contact when using the ladder.</p>
5. Secure/Leave Site. If backfilling, see excavation backfilling and compaction JSA for potential hazards and critical actions.	<p><b>5a. FALL:</b> Potential Slip, Trip or Fall - may cause muscle strains or tears, abrasions or lacerations, or broken bones.</p>	<p>5a. See 1c.</p> <p>5a. All open excavations must be backfilled or secured prior to departure with steel plates, orange construction fence or temporary chain link fencing.</p>

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## Heat and Cold Stress Guidelines

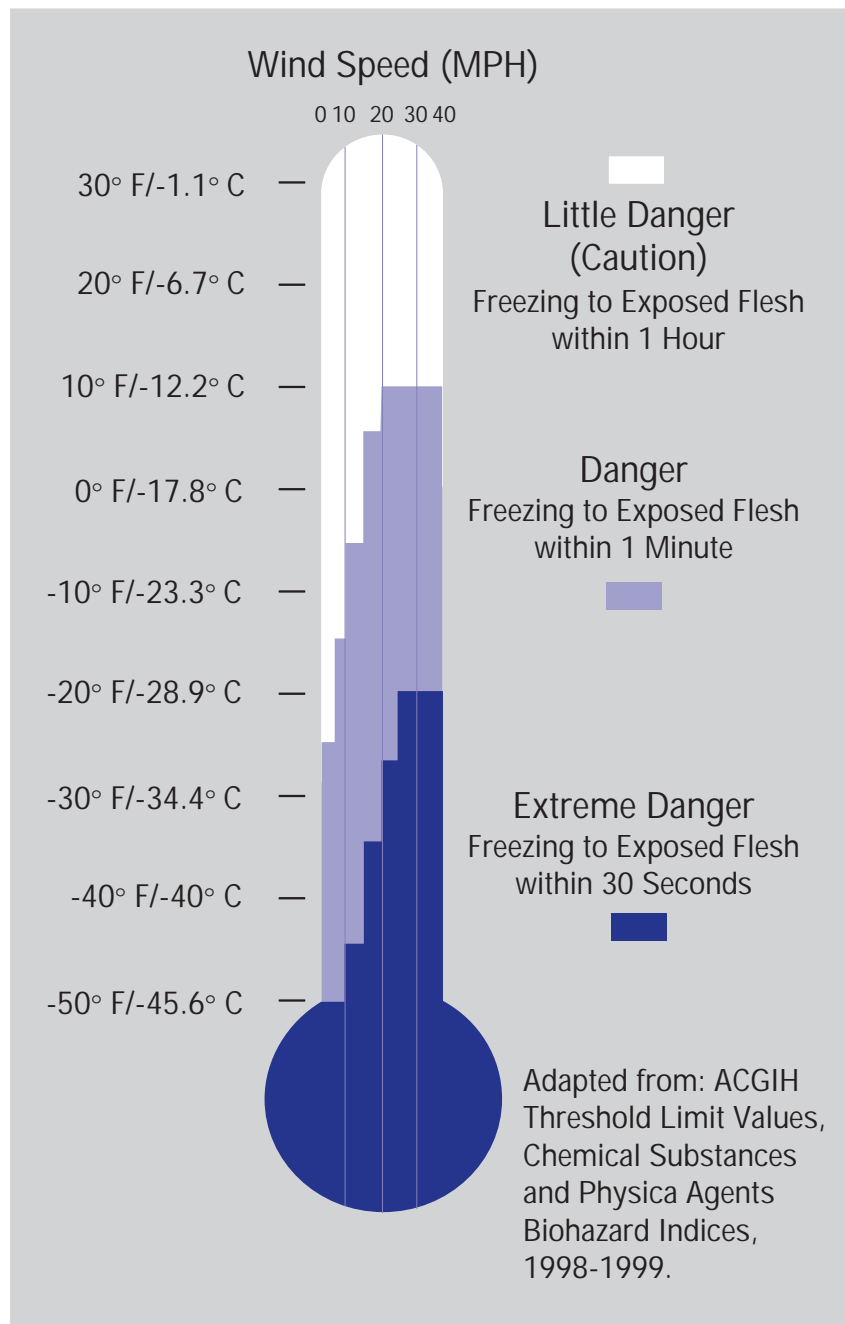


## THE COLD STRESS EQUATION

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:





OSHA

# Occupational Safety & Health Administration We Can Help

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## OSHA Technical Manual

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### SECTION III: CHAPTER 4

#### HEAT STRESS

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*For problems with accessibility in using figures and illustrations in this document, please contact the Office of Science and Technology Assessment at (202) 693-2095.*

#### 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

$$\text{Average}_M = \frac{(M_1)(t_1) + (M_2)(t_2) + \dots + (M_n)(t_n)}{(t_1) + (t_2) + \dots + (t_n)}$$

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
<b>Total:</b>	<b>6.0 kcal/min</b>

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

<i>Type of work</i>	<i>Average kcal/min</i>	<i>Range kcal/min</i>
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<sup>2</sup> body surface (19.4 ft<sup>2</sup>).

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 <i>Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices</i> (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/m<sup>2</sup>/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 <sub>3</sub>	Difference between P <sub>1</sub> and P <sub>3</sub>
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  $-5^{\circ}\text{C}$  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  $-5^{\circ}\text{C}$  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.

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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](http://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<sup>★</sup> (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<sup>★</sup>

☐ 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](http://www.concentra.com))



Improving America's health, one patient at a time.

## Patient Information

### 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 Requesting Services

**Employer**  
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](mailto: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: \_\_\_\_\_

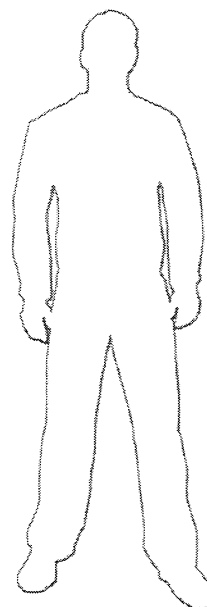
Where were you when the injury occurred?: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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, a 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](mailto: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? \_\_\_\_\_

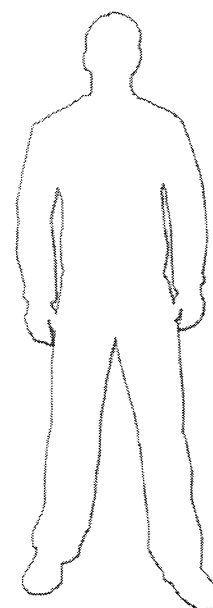
\_\_\_\_\_

\_\_\_\_\_

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

**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**

<b>Project #:</b> _____ <b>Project Name:</b> _____ <b>Project Location</b> (street address/city/state): _____  <b>Client Corporate Name / Contact / Address / Phone #:</b> _____ _____ _____ _____ _____ _____		<b>Immediate Verbal Notifications Given To:</b>  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  <b>REPORT TYPE:</b> <input type="checkbox"/> Loss <input type="checkbox"/> Near Loss   Estimated Costs: \$ _____	<b>REPORT STATUS (time due):</b> <input type="checkbox"/> Initial (24 hr) <input type="checkbox"/> Final (5-10 days) Date: _____ Date: _____  <b>Accident Report Delivered To:</b> 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		
<b>OSHA CASE # Assigned by Corporate Health &amp; Safety if Applicable:</b> _____		<b>Corporate Health &amp; Safety Confirmed Final Accident Report</b> <input type="checkbox"/> Yes <input type="checkbox"/> No			
<b>DATE OF INCIDENT:</b> _____	<b>TIME INCIDENT OCCURRED:</b> _____ <input type="checkbox"/> AM <input type="checkbox"/> PM	<b>INCIDENT LOCATION</b> – City, State, and Country (If outside U.S.A.) _____			
<b>INCIDENT TYPES: (Select most appropriate if Loss occurred.)</b> From lists below, please select the option that best categories the incident. When selecting an injury or illness, also indicate the severity level. <div style="display: flex; justify-content: space-between;"><div style="width: 30%;"><b><input type="checkbox"/> INJURY</b> -----<b>Severity Level</b>----- <input type="checkbox"/> Fatality   <input type="checkbox"/> First Aid   <input type="checkbox"/> Medical <input type="checkbox"/> Restricted Work   <input type="checkbox"/> Lost Time   Treatment</div><div style="width: 30%;"><b>OTHER INCIDENT TYPES</b> <input type="checkbox"/> Spill / Release Material involved: _____ Quantity (U.S. Gallons): _____</div><div style="width: 30%;"><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</div></div>					
<table border="0" style="width:100%;"><tr><td style="width:33%; vertical-align: top;"><b>ACTIVITY TYPE (Check most appropriate one.)</b> <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/   <input type="checkbox"/> Trenching <input type="checkbox"/> Drilling   Maintenance   <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</td><td style="width:33%; vertical-align: top;"><b>INJURY TYPE (Check all applicable.)</b> <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 _____</td><td style="width:33%; vertical-align: top;"><b>BODY PART AFFECTED (Check all applicable.)</b> <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 _____</td></tr></table>			<b>ACTIVITY TYPE (Check most appropriate one.)</b> <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/ <input type="checkbox"/> Trenching <input type="checkbox"/> Drilling   Maintenance <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	<b>INJURY TYPE (Check all applicable.)</b> <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 _____	<b>BODY PART AFFECTED (Check all applicable.)</b> <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 _____
<b>ACTIVITY TYPE (Check most appropriate one.)</b> <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/ <input type="checkbox"/> Trenching <input type="checkbox"/> Drilling   Maintenance <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	<b>INJURY TYPE (Check all applicable.)</b> <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 _____	<b>BODY PART AFFECTED (Check all applicable.)</b> <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 _____			
<b>I. PERSON(S) DIRECTLY / INDIRECTLY INVOLVED IN INCIDENT (Attach additional information as necessary/applicable.)</b>					
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)					
<b>II. PERSONS INJURED IN INCIDENT (Attach additional information as necessary/applicable.)</b>					
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)					
<b>III. PROPERTY DAMAGED IN INCIDENT (Attach additional information as necessary/applicable.)</b>					
Property Damaged:	Property Location:	Owner Name, Address & Phone #:	Description of Damage:	Estimated Cost:	
1)				\$	



## Accident Report – Page 2

2)				\$
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**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):
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**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)

<b>AGENCY</b> AJ Gallagher Risk Management Services 377 Oak Street Garden City, NY 11530		<b>INSURED LOCATION CODE</b>		<b>DATE OF LOSS AND TIME</b>		<b>AM</b> <b>PM</b>	
<b>CONTACT NAME</b> Teresa Garzla		<b>CARRIER</b> Great Divide Insurance Company				<b>NAIC CODE</b> 25224	
<b>PHONE (AG, No, Ext):</b> 516.622.2418		<b>POLICY NUMBER</b> BAP154979912					
<b>FAX (AG, No):</b>		<b>POLICY TYPE</b> Commercial Automobile					
<b>E-MAIL ADDRESS:</b>							
<b>CODE:</b>		<b>SUBCODE:</b>					
<b>AGENCY CUSTOMER ID:</b> ROUXASS-01							

**INSURED**

<b>NAME OF INSURED (First, Middle, Last)</b> Roux Associates, Inc.			<b>INSURED'S MAILING ADDRESS</b> 209 Shafter Street Islandia, NY 11749		
<b>DATE OF BIRTH</b>	<b>FEIN (if applicable)</b> 11-2579482	<b>MARITAL STATUS / CIVIL UNION (if applicable)</b>			
<b>PRIMARY PHONE #</b> <input type="checkbox"/> HOME <input checked="" type="checkbox"/> BUS <input type="checkbox"/> CELL 631.232.2600	<b>SECONDARY PHONE #</b> <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	<b>PRIMARY E-MAIL ADDRESS:</b> legaldept@rouxinc.com			
		<b>SECONDARY E-MAIL ADDRESS:</b> Fax Notice of Loss to: 631.232.1525			

**CONTACT**

<b>NAME OF CONTACT (First, Middle, Last)</b> Cindy Albanese			<b>CONTACT'S MAILING ADDRESS</b> Cindy Albanese 209 Shafter Street Islandia, NY 11749		
<b>PRIMARY PHONE #</b> <input type="checkbox"/> HOME <input checked="" type="checkbox"/> BUS <input type="checkbox"/> CELL	<b>SECONDARY PHONE #</b> <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	<b>PRIMARY E-MAIL ADDRESS:</b> legaldept@rouxinc.com			
		<b>SECONDARY E-MAIL ADDRESS:</b> Fax Notice of Loss to 631.232.1525			

**LOSS**

<b>LOCATION OF LOSS</b>		<b>POLICE OR FIRE DEPARTMENT CONTACTED</b>	
<b>STREET:</b>			
<b>CITY, STATE, ZIP:</b>		<b>REPORT NUMBER</b>	
<b>COUNTRY:</b>			
<b>DESCRIBE LOCATION OF LOSS IF NOT AT SPECIFIC STREET ADDRESS:</b>			
<b>DESCRIPTION OF ACCIDENT (ACORD 101, Additional Remarks Schedule, may be attached if more space is required)</b>			

**INSURED VEHICLE**

<b>VEH #</b>	<b>YEAR</b>	<b>MAKE</b>	<b>BODY TYPE</b>	<b>PLATE NUMBER</b>	<b>STATE</b>
		<b>MODEL:</b>	<b>V.I.N.:</b>		
<b>OWNER'S NAME AND ADDRESS</b> (Check if same as insured)			<b>PRIMARY PHONE #</b> <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	<b>SECONDARY PHONE #</b> <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	
			<b>PRIMARY E-MAIL ADDRESS:</b>		
			<b>SECONDARY E-MAIL ADDRESS:</b>		
<b>DRIVER'S NAME AND ADDRESS</b> (Check if same as owner)			<b>PRIMARY PHONE #</b> <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	<b>SECONDARY PHONE #</b> <input type="checkbox"/> HOME <input type="checkbox"/> BUS <input type="checkbox"/> CELL	
			<b>PRIMARY E-MAIL ADDRESS:</b>		
			<b>SECONDARY E-MAIL ADDRESS:</b>		
<b>RELATION TO INSURED (Employee, family, etc.)</b>	<b>DATE OF BIRTH</b>	<b>DRIVER'S LICENSE NUMBER</b>	<b>STATE</b>	<b>PURPOSE OF USE</b>	<b>USED WITH PERMISSION? (Y/N)</b>
<b>DESCRIBE DAMAGE</b>					
<b>1. WAS A STANDARD CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) INSTALLED IN THE VEHICLE AT THE TIME OF THE ACCIDENT?</b>					<b>Y/N</b>
<b>2. WAS THE CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) IN USE BY A CHILD DURING THE TIME OF THE ACCIDENT?</b>					<b>Y/N</b>
<b>3. DID THE CHILD PASSENGER RESTRAINT SYSTEM (CHILD SEAT) SUSTAIN A LOSS AT THE TIME OF THE ACCIDENT?</b>					<b>Y/N</b>
<b>ESTIMATE AMOUNT:</b>		<b>WHERE CAN VEHICLE BE SEEN?:</b>		<b>WHEN CAN VEHICLE BE SEEN?:</b>	
<b>OTHER INSURANCE ON VEHICLE - CARRIER:</b>			<b>POLICY NUMBER:</b>		

OTHER VEHICLE / PROPERTY DAMAGED

NON - VEHICLE? ☐

AGENCY CUSTOMER ID: \_\_\_\_\_

VEH #	YEAR	MAKE:	BODY TYPE:	PLATE NUMBER	STATE
		MODEL:	V.I.N.:		
DESCRIBE PROPERTY (Other Than Vehicle)					OTHER VEH/PROP INS? (Y/N)
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
			PRIMARY E-MAIL ADDRESS:		
DRIVER'S NAME AND ADDRESS <input type="checkbox"/> (Check if same as owner)			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
-------------	-------------

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: ☐ New York ☐ Massachusetts ☐ New Jersey ☐ Illinois ☐ CA - Los Angeles ☐ 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. ☐ Fire / Explosion    3. ☐ Security (e.g. theft, trespassing, vandalism)    4. ☐ Environmental (spill, permit exceedance, etc.)    6. ☐ Property/Equipment Damage  
2. ☐ Injury / Illness    5. ☐ Transportation of personnel (vehicle accident)    7. ☐ Business Interruption

Event Leading to Potential Injury/Illness:

Job Task\*:

Equipment Involved\*:

**WHAT HAPPENED?** Do not include individuals' names. Ensure photos, sketches, etc. are not personally identifiable unless written consent has been obtained.

**Summary** (1-2 sentences. Provide brief description of the incident. Provide facts only, no speculation or opinion):

**Incident Details** (Brief factual details of what, where, when; include photos, sketches, etc. as attachments):

**Immediate Corrective Actions Taken:**

### SERIOUS INJURY OR FATALITY (SIF):

IF AN ACTUAL SIF, USE EXISTING ROUX ACCIDENT REPORTING FORM

Could this have resulted in a SIF? ☐ Yes ☐ No

A potential SIF is defined as likely to have caused an injury resulting in significant physical body damage with probable long term and/or life altering complications.

### INCIDENT INVOLVED:

Roux Employee: ☐ Yes ☐ No Subcontractor Company Name:

#### INVESTIGATION TEAM

NAME	JOB TITLE	NAME	JOB TITLE

## PART 3: INCIDENT INVESTIGATION FINDINGS AND REPORT QUALITY REVIEW

Date Investigation 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



			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)

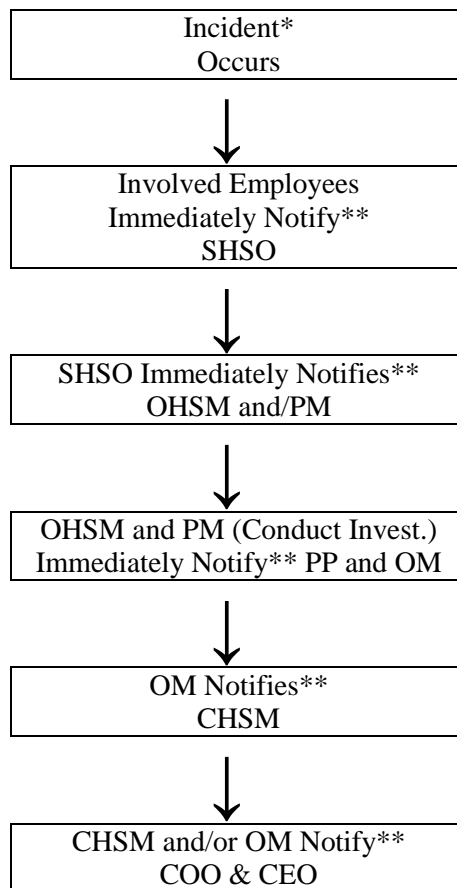
- |                            |   |                          |  |
|----------------------------|---|--------------------------|--|
| 1. Carbon Change           | 7. Gauging  | 12. Pavement Cutting     | 18. System Startup                               |
| 2. Construction            | 8. Geoprobe / Direct 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  | 117. No Equipment Involved         |
| 20. Excavator / Power Shovel   | 44. Hoist                   | 70. Gloves                         | 96. POET System                        | 118. MPT – Traffic Control Devices |
| 21. Exclusion Zone Equipment   | 45. Hook/Clamp/Buckle, etc. | 71. Hard Hat / Helmet              | 97. Shed or Trailer                    | 118. Not in List (describe): _____ |
| 22. Fan / Blower               | 46. Jack                    | 72. Hearing Protection             |  |                                    |
| 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                 |  |                                    |

## Incident Notification Flow Chart

Health & Safety Near/Loss – Loss (Incident)\*  
Notification Flow Chart



\* Incident – any work or site-related occurrence that resulted in, or could potentially have resulted in, the need for medical care or in property damage (i.e., all injuries or illnesses, exposure to toxic materials or any other significant occurrence resulting in property damage or in a "near loss")

\*\* Verbal Notification

Initial Incident Report (written) to SHSO, OHSM, OM and CHSM within 24 hours  
Follow-up Report within one week.

(Reference: Corporate H&S Standard Operating Procedure, Incident Investigation and Reporting, SOP #1.8, dated March 2000)

**AllOne Health Form**



**REPORT WORK-RELATED INJURIES OR A NEW ILLNESS  
TO ALLONE HEALTH (AOH) IMMEDIATELY!**

### **Employee Responsibilities**

- 1. Report the injury to your supervisor/manager**
- 2. Call AllOne Health at 1.800.350.4511, PRESS 1 to report an injury for Roux Associates, Inc.** The nurses will help determine the best type of care needed for the immediate situation, where to go for treatment, and work with you and providers on an ongoing basis.
- 3. Be ready to supply:**
  - ✓ Your name & contact information, including mobile phone
  - ✓ Your location (nearest city, town or area)
  - ✓ Supervisor/Manager name & contact information
  - ✓ Description of the injury, details of incident, and any existing medical conditions the nurse should be aware of (e.g., allergies, pacemaker...)
- 4. Follow AllOne Health instructions (e.g., first aid, go to urgent care center, or other)**
- 5. Immediately after your visit, contact the AllOne Health Nurse Care Manager at 1.800.350.4511 (press 1) or the direct number provided by the nurse to discuss your condition, treatment and any next steps.**
- 6. Follow the company protocols as communicated to you by your supervisor, CHSM or OHSM.**
- 7. Contact the AllOne Health Nurse with any questions or concerns about your condition.**
- 8. Communicate with your AllOne Health Nurse Care Manager about ALL further treatment relating to this case.** They are available to assist you in your recovery and make sure you receive the proper medical care you need!

**In case of serious injury, call 911 or head to the nearest  
emergency center, calling AOH along the way!**

### **AllOne Health Responsibilities**

- 1. AOH Nurse speaks to supervisor (if available) to gather information about employee and injury**
- 2. AOH Nurse speaks to employee about incident, level of pain, and any other medical conditions that could impact treatment**
- 3. AOH Nurse provides first aid measures to the injured employee**
- 4. When a medical evaluation is recommended, AOH calls the Roux Associates, Inc. identified facility to advise them the employee is coming and why, and faxes a release form and return-to-work form to the facility. After the visit, the Nurse reaches out to the facility to obtain the diagnosis and information on any treatment that was received and/or recommended.**
- 5. AOH Nurse contacts the employee within 24 hours to assess their condition and answer any questions**
- 6. Care management will continue until the employee returns to full duty or the care management is turned over to the Workers' Compensation provider.**
- 7. Throughout the process, AOH will communicate with the employee and his/her providers, and provide Roux Associates, Inc. management with email updates.**

**Interim Remedial Measure Work Plan**  
***Morton Village Plaza Shopping Center***

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**PLATES**

Air and Soil Vapor Results



