

# **Remedial Action Plan**

**For**  
**33-01 38<sup>th</sup> Avenue**  
**Queens, New York**  
**Block 375, Lot 33**  
**OER Project Number 12EHAZ013Q**

**E-Designation E-218**  
**CEQR Number 08DCP021Q**  
**Dutch Kills Rezoning and Related Actions**

**Prepared for:**  
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# REMEDIAL ACTION PLAN

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## LIST OF ACRONYMS

Acronym	Definition
AST	Aboveground Storage Tank
CAMP	Community Air Monitoring Plan
C&D	Construction & Demolition
CEQR	City Environmental Quality Review
CFR	Code of Federal Regulations
CHASP	Construction Health and Safety Plan
CO	Certificate of Occupancy
CPC	City Planning Commission
DSNY	Department of Sanitation
“E”	E-Designation
EAS	Environmental Assessment Statement
EIS	Environmental Impact Statement
ESA	Environmental Site Assessment
EC/IC	Engineering Control and Institutional Control
ELAP	Environmental Laboratory Accreditation Program
FDNY	New York City Fire Department
GPR	Ground Penetrating Radar
HASP	Health and Safety Plan
HAZWOPER	Hazardous Waste Operations Emergency Response
IDW	Investigation Derived Waste
Notice - NNO	Notice of No Objection
Notice - NTP	Notice To Proceed
Notice - NOS	Notice Of Satisfaction
Notice - FNOS	Final Notice of Satisfaction
NYC BSA	New York City Board of Standards and Appeals
NYC DCP	New York City Department of City Planning
NYC DEP	New York City Department of Environmental Protection
NYC DOB	New York City Department of Buildings
NYC DOF	New York City Department of Finance
NYC HPD	New York City Housing Preservation and Development
NYCRR	New York Codes Rules and Regulations
NYC OER	New York City Office of Environmental Remediation

NYS DEC	New York State Department of Environmental Conservation
NYS DEC DER	New York State Department of Environmental Conservation Division of Environmental Remediation
NYS DEC PBS	New York State Department of Environmental Conservation Petroleum Bulk Storage
NYS DOH	New York State Department of Health
NYS DOT	New York State Department of Transportation
OSHA	United States Occupational Health and Safety Administration
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
PE	Professional Engineer
PID	Photo Ionization Detector
PM	Particulate Matter
QEP	Qualified Environmental Professional
RA	Register Architect
RAP	Remedial Action Plan
RCA	Recycled Concrete Aggregate
RCR	Remedial Closure Report
RD	Restrictive Declaration
RI	Remedial Investigation
SCOs	Soil Cleanup Objectives
SCG	Standards, Criteria and Guidance
SMP	Site Management Plan
SPDES	State Pollutant Discharge Elimination System
SSDS	Sub-Slab Depressurization System
SVOCs	Semi-Volatile Organic Compounds
USCS	Unified Soil Classification System
USGS	United States Geological Survey
UST	Underground Storage Tank
TAL	Target Analyte List
TCL	Target Compound List
TCO	Temporary Certificate of Occupancy
VB	Vapor Barrier
VOCs	Volatile Organic Compounds

# CERTIFICATION

I, Arnold F. Fleming, am a Professional Engineer licensed in the State of New York. I have primary direct responsibility for implementation of the remedial action for the 33-01 38<sup>th</sup> Avenue Site #12EHAZ013Q.

I, Arnold F. Fleming, am a Qualified Environmental Professional as defined in §43-140. I have primary direct responsibility for implementation of the remedial action for the 33-01 38th Avenue Site #12EHAZ013Q.

I certify that this Remedial Action Plan (RAP) has a plan for handling, transport and disposal of soil, fill, fluids and other materials removed from the property in accordance with applicable City, State and Federal laws and regulations. Importation of all soil, fill and other material from off-Site will be in accordance with all applicable City, State and Federal laws and requirements. This RAP has provisions to control nuisances during the remediation and all invasive work, including dust and odor suppression.

Arnold F. Fleming  
Name

050411  
NYS PE License Number

Arnold F. Fleming  
Signature

2/19/15  
Date



## **EXECUTIVE SUMMARY**

Arnold F. Fleming, P.E. and Fleming Lee-Shue (FLS), on behalf of 38<sup>th</sup> Avenue Partners LLC, established this plan to remediate a 22,276-square foot site located at 33-01 38<sup>th</sup> Avenue in Queens, New York. A Phase II Subsurface Investigation (Phase II) was performed to compile and evaluate data and information necessary to develop this Remedial Action Plan (RAP). The remedial action described in this document achieves the remedial objectives, complies with applicable environmental standards, criteria and guidance and conforms with applicable laws and regulations.

### **Site Location and Current Usage**

The Site is located at 33-01 38<sup>th</sup> Avenue in the Dutch Kills section in Queens, New York and is identified as Block 375, Lot 33 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 22,276-square feet is bounded by 33<sup>rd</sup> Street to the west, 38<sup>th</sup> Avenue to the south, 34<sup>th</sup> Street to the east and two 1-story warehouses to the north. A map of the site boundary is shown in Figure 2. The Site is developed with one 2-story building used as storage and offices. A parking lot is located in the northwest portion of the Site. The building contains a full basement and is used as commercial office and storage space for a variety of tenants including an eyeglasses supplier, electronics supplier and contracting firms.

### **Summary of Proposed Redevelopment Plan**

The proposed future use of the Site will consist of a conversion of the existing building into residential apartments. The renovation will include the addition of three floors and a penthouse to the existing building. Excavation is only anticipated for a new elevator pit and possible small utility trenches. Very light grading may take place in the parking lot area but will not include any soil removal. The renovation plans are provided in Appendix A. Layout of the Site and existing building to be renovated is presented in Figure 2. The current zoning designation is M1-2/R6A. The proposed use is consistent with existing zoning for the property.

## **Findings of Environmental Investigation**

1. Elevation of the property is approximately 26 feet above sea level.
2. Depth to groundwater is approximately 14 feet below sidewalk grade at the Site.
3. Groundwater flow is assumed to generally flow from north to south beneath the Site.
4. Bedrock was not encountered at the Site during this investigation
5. The stratigraphy of the Site, consists of brown fine to coarse sand with traces of silt.
6. Soil/fill samples collected during the RI showed that no volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, or polychlorinated biphenols (PCBs) were detected in any of the soil samples at concentrations exceeding the 6 NYCRR Part 375-6.8 Unrestricted Use Soil Cleanup Objectives (SCOs). Trace concentrations of acetone and methylene chloride were detected in one or more samples. Several metals were identified, but only lead (at 86.4 mg/kg in SB-4(0-2)) was detected in one of the ten soil samples at a concentration exceeding the Unrestricted Use SCOs.
7. Groundwater samples collected during the RI showed that no SVOCs, pesticides, or PCBs were detected in any of the groundwater samples at concentrations exceeding New York State Technical and Operational Guidance Series Class GA Groundwater Standards (TOGS). The VOC tetrachloroethene (PCE) was detected in each groundwater sample at concentrations greater than TOGS (at the maximum concentration of 21.9 ug/L detected in sample GW-1). The VOC trichloroethene (TCE) was detected in two of the three groundwater samples at the maximum concentration of 8.0 ug/L detected in sample GW-1. Several metals were identified, but only manganese and sodium exceeded their respective TOGS.
8. The soil vapor results collected during the RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Soil vapor results showed no VOCs were detected in the ambient air samples (indoor or outdoor) at concentrations exceeding the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion. Several petroleum related compounds were detected at low levels. The

maximum concentrations of petroleum related (BTEX) were 78 ug/m<sup>3</sup>. Chlorinated VOCs were detected at elevated levels and included PCE detected in all soil vapor samples and ranged in concentrations from 303 ug/m<sup>3</sup> to 983 ug/m<sup>3</sup>. TCE was detected in four of five soil vapor samples at a maximum concentration of 32 ug/m<sup>3</sup>. Carbon tetrachloride and TCA were detected at trace levels. The concentrations of TCE and PCE are above the monitoring ranges in matrices established in the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion, and require monitoring/mitigation.

### **Summary of the Remedy**

The proposed remedial action achieves all of the remedial action goals established for the project. The proposed remedial action is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants and uses standard methods that are well established in the industry. The proposed remedial action will consist of:

1. Perform a Community Air Monitoring Program for particulates and volatile organic carbon compounds.
2. Establish Restricted Residential Soil Cleanup Objectives (RRSCOs)
3. Excavation and removal of soil/fill for development purposes. Soil excavation is only anticipated for a new elevator pit and small utility trenches. The estimated volume of material to be removed is 35 cubic yards.
4. Construction and maintenance of an engineered composite cover consisting of the existing building slabs (ranging in thickness from 5"-14"), new concrete building slabs in areas where renovations will require removing the existing slab (minimum 5" thickness), and an asphalt capped parking area to prevent human exposure to residual soil/fill remaining under the Site.
5. Installation of a vapor barrier membrane beneath the renovated building slab in the northeast portion of the site, as shown in Figure 6, to mitigate potential vapor exposure pathways within the building.
6. Installation and operation of an active sub-slab depressurization system.

7. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite.
9. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.
10. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
11. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.
12. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
13. Submission of a Remedial Closure Report (RCR) that describes the remedial activities, certifies that the remedial requirements have been achieved, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAP.

# **REMEDIAL ACTION PLAN**

## **1.0 SITE BACKGROUND**

This Remedial Action Plan (RAP) and site-specific Construction Health and Safety Plan (CHASP) have been developed for project located at 33-01 38<sup>th</sup> Avenue in the Dutch Kills section of Queens, New York (the Site). This project has been assigned project number 12EHAZ013Q by OER. This RAP describes the remediation and/or mitigation activities to be implemented at the Site in coordination with the New York City Office of Environmental Remediation (OER) for the purposes of satisfying the requirements of the Hazardous Materials E-Designation Program and obtaining a Notice To Proceed. An E-Designation for Hazardous Materials (E-218) was placed on the Site by the New York City Department of City Planning (DCP) as part of the October 2008 Dutch Kills Rezoning and Related Actions rezoning action (CEQR number 08DCP021Q). The site-specific CHASP (Appendix B) addresses site-specific hazards, identified contaminants of concern and safety requirements associated with remediation and mitigation activities in accordance with ASTM and OSHA guidelines.

### **1.1 Site Location and Current Usage**

The Site is located at 33-01 38<sup>th</sup> Avenue in the Dutch Kills section in Queens, New York and is identified as Block 375, Lot 33 on the New York City Tax Map. Figure 1 shows the Site location. The Site is 22,276-square feet is bounded by 33<sup>rd</sup> Street to the west, 38<sup>th</sup> Avenue to the south, 34<sup>th</sup> Street to the east and two 1-story warehouses to the north. A map of the site boundary is shown in Figure 2. The Site is developed with one 2-story building used as storage and offices. A parking lot is located in the northwest portion of the Site. The building contains a full basement and is used as commercial office and storage space for a variety of tenants including an eyeglasses supplier, electronics supplier and contracting firms.

### **1.2 Proposed Redevelopment Plan**

The proposed future use of the Site will consist of a conversion of the existing building into residential apartments. The renovation will include the addition of three floors and a penthouse to the existing building. Excavation is only anticipated for a new elevator pit and possible small utility trenches. Very light grading may take place in the parking lot area but will not include any



soil removal. The renovation plans are provided in Appendix A. Layout of the Site and existing building to be renovated is presented in Figure 2. The current zoning designation is M1-2/R6A. The proposed use is consistent with existing zoning for the property.

### **1.3 Description of Surrounding Property**

The Site is located in the Dutch Kills section of Queens County, a longtime manufacturing district recently rezoned by New York City to allow a mixed residential commercial neighborhood. The Site lies in an area containing a mixture of residential buildings, office buildings, and commercial enterprises consisting of warehouses, light manufacturing, retail, and shipping terminals. No schools, hospitals or day care facilities are located within a 500-foot radius of the Site.

### **1.4 Environmental Investigation Reports**

The following environmental work plans and reports were developed for the Site:

*Remedial Investigation Report*, January 2015, prepared by Fleming-Lee Shue, Inc.

Figure 3 shows the remedial investigation (RI) sampling plan and Tables 1 through 9 summarize the RI analytical results. The following work has been performed at the Site:

1. Conducted a Site inspection to identify AOCs and physical obstructions (i.e. structures, buildings, etc.);
2. Installed 5 soil borings across the entire project Site, and collected 10 soil samples for chemical analysis from the soil borings to evaluate soil quality;
3. Installed 3 temporary groundwater monitoring wells throughout the Site and collected 3 groundwater samples for chemical analysis to evaluate groundwater quality;
4. Installed 1 soil vapor probes and 4 sub-slab vapor points throughout the Site and collected 5 soil vapor samples for chemical analysis;
5. Collected 1 indoor and 1 outdoor ambient air samples.
6. Conducted a geophysical survey to identify and anomalies indicative of underground storage tanks.

## **1.5 Findings of Environmental Investigation**

1. Elevation of the property is approximately 26 feet above sea level.
2. Depth to groundwater is approximately 14 feet below sidewalk grade at the Site.
3. Groundwater flow is assumed to generally flow from north to south beneath the Site.
4. Bedrock was not encountered at the Site during this investigation
5. The stratigraphy of the Site, consists of brown fine to coarse sand with traces of silt.
6. Soil/fill samples collected during the RI showed that no volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, or polychlorinated biphenols (PCBs) were detected in any of the soil samples at concentrations exceeding the 6 NYCRR Part 375-6.8 Unrestricted Use Soil Cleanup Objectives (SCOs). Trace concentrations of acetone and methylene chloride were detected in one or more samples. Several metals were identified, but only lead (at 86.4 mg/kg in SB-4(0-2)) was detected in one of the ten soil samples at a concentration exceeding the Unrestricted Use SCOs.
7. Groundwater samples collected during the RI showed that no SVOCs, pesticides, or PCBs were detected in any of the groundwater samples at concentrations exceeding New York State Technical and Operational Guidance Series Class GA Groundwater Standards (TOGS). The VOC tetrachloroethene (PCE) was detected in each groundwater sample at concentrations greater than TOGS (at the maximum concentration of 21.9 ug/L detected in sample GW-1). The VOC trichloroethene (TCE) was detected in two of the three groundwater samples at the maximum concentration of 8.0 ug/L detected in sample GW-1. Several metals were identified, but only manganese and sodium exceeded their respective TOGS.
8. The soil vapor results collected during the RI were compared to the compounds listed in Table 3.1 Air Guideline Values Derived by the NYSDOH located in the New York State Department of Health (NYSDOH) Final Guidance for Evaluating Soil Vapor Intrusion. Soil vapor results showed no VOCs were detected in the ambient air samples (indoor or outdoor) at concentrations exceeding the NYSDOH Final

Guidance for Evaluating Soil Vapor Intrusion. Several petroleum related compounds were detected at low levels. The maximum concentrations of petroleum related (BTEX) were 78 ug/m<sup>3</sup>. Chlorinated VOCs were detected at elevated levels and included PCE detected in all soil vapor samples and ranged in concentrations from 303 ug/m<sup>3</sup> to 983 ug/m<sup>3</sup>. TCE was detected in four of five soil vapor samples at a maximum concentration of 32 ug/m<sup>3</sup>. Carbon tetrachloride and TCA were detected at trace levels. The concentrations of TCE and PCE are above the monitoring ranges in matrices established in the NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion, and require monitoring/mitigation.

For environmental investigation data, consult reports listed in Section 1.4. Based on an evaluation of the environmental data and information, disposal of significant amounts of hazardous waste is not suspected at this site.

## **2.0 DESCRIPTION OF REMEDIATION**

### **2.1 Objectives**

The Site remediation and mitigation objectives are:

#### **Soil**

- Prevent direct contact with contaminated soil.
- Prevent exposure to contaminants volatilizing from contaminated soil.

#### **Groundwater**

- Prevent direct exposure to contaminated groundwater.
- Prevent exposure to contaminants volatilizing from contaminated groundwater.

#### **Soil Vapor**

- Prevent exposure to contaminants in soil vapor.
- Prevent migration of soil vapor into dwelling and other occupied structures.

Remedial and mitigation measures described herein will be performed in accordance with applicable laws and regulations, and the site-specific CHASP. This remedy is protective of public health and/or the environment for the intended use.

### **2.2 Summary of Remedial Action**

The proposed plan achieves all of the remedial action goals established for the project. The proposed remedial action is effective in both the short-term and long-term and reduces mobility, toxicity and volume of contaminants and uses standard methods that are well established in the industry.

The proposed remedial action will consist of:

1. Perform a Community Air Monitoring Program for particulates and volatile organic carbon compounds.

2. Establish Restricted Residential Soil Cleanup Objectives (RRSCOs)
3. Excavation and removal of soil/fill for development purposes. Soil excavation is only anticipated for a new elevator pit and small utility trenches. The estimated volume of material to be removed is 35 cubic yards.
4. Construction and maintenance of an engineered composite cover consisting of the existing building slabs (ranging in thickness from 5"-14"), new concrete building slabs in areas where renovations will require removing the existing slab (minimum 5" thickness), and an asphalt capped parking area to prevent human exposure to residual soil/fill remaining under the Site.
5. Installation of a vapor barrier membrane beneath the renovated building slab in the northeast portion of the site, as shown in Figure 6, to mitigate potential vapor exposure pathways within the building.
6. Installation and operation of an active sub-slab depressurization system.
7. Import of materials to be used for backfill and cover in compliance with this plan and in accordance with applicable laws and regulations.
8. Transportation and off-Site disposal of all soil/fill material at permitted facilities in accordance with applicable laws and regulations for handling, transport, and disposal, and this plan. Sampling and analysis of excavated media as required by disposal facilities. Appropriate segregation of excavated media onsite.
9. Screening of excavated soil/fill during intrusive work for indications of contamination by visual means, odor, and monitoring with a PID.
10. Site mobilization involving Site security setup, equipment mobilization, utility mark outs and marking & staking excavation areas.
11. Implementation of storm-water pollution prevention measures in compliance with applicable laws and regulations.

12. Performance of all activities required for the remedial action, including permitting requirements and pretreatment requirements, in compliance with applicable laws and regulations.
13. Submission of a Remedial Closure Report (RCR) that describes the remedial activities, certifies that the remedial requirements have been achieved, and describes all Engineering and Institutional Controls to be implemented at the Site, and lists any changes from this RAP.

### **2.3 Soil Cleanup Objectives and Soil/Fill Management**

Soil Cleanup Objectives (SCOs) proposed for this project are Restricted Residential SCOs. Soil and materials management on-Site and off-Site, including excavation, handling and disposal, will be conducted in accordance with the Soil/Materials Management Plan in Appendix C. The location of planned excavations is shown in Figure 4.

Discrete contaminant sources (such as hotspots) identified during the remedial action will be horizontally and vertically identified by GPS or surveyed. This information will be provided in the RCR.

#### **Estimated Soil/Fill Removal Quantities**

The total quantity of soil/fill expected to be excavated and disposed off-Site for redevelopment purposes is approximately 35 cubic yards. Soil excavation is only anticipated for a new elevator pit and small utility trenches. Based on the RI results, no soil/fill at the Site exceeds the Restricted Residential SCOs so no remedial excavation is required. Soil disposal locations will be reported promptly to the OER Project Manager once they have been determined.

#### **Import and Reuse of Soils**

Import of soils onto the property and reuse of soils already onsite will be performed in conformance with the Soil/Materials Management Plan in Appendix C. At this time, no soil is expected to be imported or reused at the Site.

## **2.4 Engineering Controls**

Engineering Controls were employed in the remedial action to address residual contamination remaining at the site. The Site has two primary Engineering Control (EC) System. These are:

- Composite cover system
- Retrofitted active sub-slab depressurization system (SSDS)
- Vapor barrier system

### **Composite Cover System**

Exposure to residual soil/fill will be prevented by an engineered, composite cover system to be built on the Site. This composite cover system is comprised of:

- Asphalt covered parking lot;
- Existing concrete building slabs (ranging in thickness from 5" to 14");
- New concrete building slab in all areas where renovations require removing the existing slab (minimum 5" thickness).

In addition, all foundation cracks/voids, utility inlets, drains, etc. will be sealed with an industry-standard commercial grade 50-year rated caulking/sealant as a standard construction practice. Figure 5 shows the location of each cover type built at the Site.

The composite cover system is a permanent engineering control for the Site.

### **Sub-Slab Depressurization System**

Migration of soil vapor will be mitigated with the construction of an active SSDS. The sub-slab ventilation system will prevent accumulation of potential soil vapor beneath the building and prevent migration of soil vapor into the occupied indoor spaces. The preliminary SSDS layout is shown on Figure 6. The specifications and details for the SSDS will be determined after a field diagnostic test to be performed prior to installation. Documentation of the SSDS fan and specifications will be included in the RCR. The SSDS will consist of several sub-slab depressurization pits installed beneath the existing foundation slab. These pits will be spaced based on diagnostic testing to confirm influence radius beneath the existing foundation slab. The

pits and influence radius will cover the entire building footprint with the exception of the deeper foundation section in the northeast corner of the building which is immediately adjacent groundwater. This section of the building will have a vapor barrier placed above the existing slab and then be covered with a new, concrete finishing slab. Vapor Barrier System described in greater detail below. The risers from the sub-slab depressurization pits may either transverse the building as single stacks or be manifold into a single exhaust stack. Any exhaust stack(s) will be located at least 25 feet away from any fresh air intakes. A suction fan(s) connected to the riser(s) will vent create a negative differential pressure beneath the building slab and prevent any migration of soil vapor into the building. Several permanent monitoring ports will be installed at the Site to measure the negative differential pressure achieved beneath the building slab. Immediately following installation of the suction fan, a start-up test will be performed to confirm the required negative differential pressure at each of the monitoring ports. These monitoring ports will remain permanently accessible for future inspections.

### **Vapor Barrier System**

Since a section of the cellar slab in the northeast portion of the building is within the groundwater table, an SSDS cannot be installed in this area. Therefore, a vapor barrier membrane of a minimum thickness of 20-mil will be installed on top of the existing slab and beneath the new finishing slab to mitigate potential vapor exposure pathways. The vapor barrier will consist of Grace Florprufe® 120, or equivalent. Appendix D provides manufacturer specifications and Figure 6 shows the extent of the vapor barrier. The project's remedial Professional Engineer (PE) will provide oversight during the installation of the vapor barrier system. As-built vapor barrier drawings and photographs (maximum of two photos per page) of the installation process will be submitted with the RCR.



## **3.0 REMEDIAL ACTION MANAGEMENT**

### **3.1 Project Organization and Oversight**

Principal personnel who will participate in the remedial action include Peter Helseth and Arnold Fleming. The Professional Engineer (PE) and Qualified Environmental Professionals (QEP) for this project is Arnold Fleming.

### **3.2 Site Security**

Site access will be controlled by gated entrances and construction fencing.

### **3.3 Work Hours**

The hours for operation of remedial construction will be from 7:00 am to 5:00 pm. These hours conform to the New York City Department of Buildings construction code requirements.

### **3.4 Construction Health and Safety Plan**

The site-specific Construction Health and Safety Plan (CHASP) is included in Appendix B. The Site Safety Coordinator will be Sasha Rothenberg. Remedial work performed under this RAP will be in full compliance with applicable health and safety laws and regulations, including Site and OSHA worker safety requirements and HAZWOPER requirements. Confined space entry, if any, will comply with OSHA requirements and industry standards and will address potential risks. The parties performing the remedial construction work will ensure that performance of work is in compliance with the CHASP and applicable laws and regulations. The CHASP pertains to remedial and invasive work performed at the Site until the issuance of the Notice Of Satisfaction.

All field personnel involved in remedial activities will participate in training required under 29 CFR 1910.120, including 40-hour hazardous waste operator training and annual 8-hour refresher training. Site Safety Officer will be responsible for maintaining workers training records.

Personnel entering any exclusion zone will be trained in the provisions of the CHASP and be required to sign an CHASP acknowledgment. Site-specific training will be provided to field personnel. Additional safety training may be added depending on the tasks performed. Emergency telephone numbers will be posted at the site location before any remedial work begins. A safety meeting will be conducted before each shift begins. Topics to be discussed include task hazards and protective measures (physical, chemical, environmental); emergency procedures; PPE levels and other relevant safety topics. Meetings will be documented in a log book or specific form.

An emergency contact sheet with names and phone numbers is included in the CHASP. That document will define the specific project contacts for use in case of emergency.

### **3.5 Community Air Monitoring Plan**

Real-time air monitoring for volatile organic compounds (VOCs) and particulate levels at the perimeter of the exclusion zone or work area will be performed. Continuous monitoring will be performed for all ground intrusive activities and during the handling of contaminated or potentially contaminated media. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pit excavation or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be performed 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, for instance, will 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. Depending upon the proximity of potentially exposed individuals, continuous monitoring may be performed 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. Exceedences of action levels observed during performance of the Community Air Monitoring Plan (CAMP) will be reported to the OER Project Manager and included in the Daily Report.

## **VOC Monitoring, Response Levels, and Actions**

Volatile organic compounds (VOCs) will be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a continuous basis during invasive work. Upwind concentrations will be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work will be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment will be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment will be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- 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 will be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities will resume with continued monitoring.
- 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 will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities will 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.
- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities will be shutdown.

All 15-minute readings must be recorded and be available for OER personnel to review. Instantaneous readings, if any, used for decision purposes will also be recorded.

### **Particulate Monitoring, Response Levels, and Actions**

Particulate concentrations will be monitored continuously at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring will 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 will 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.

- 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 will be employed. Work will 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.
- 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 will be stopped and a re-evaluation of activities initiated. Work will 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.

All readings will be recorded and be available for OER personnel to review.

### **3.6 Agency Approvals**

All permits or government approvals required for remediation and construction have been or will be obtained prior to the start of remediation and construction. Acceptance of this RAP by OER does not constitute satisfaction of these requirements and will not be a substitute for any required permit.

### **3.7 Site Preparation**

#### **Pre-Construction Meeting**

OER will be invited to attend the pre-construction meeting at the Site with all parties involved in the remedial process prior to the start of remedial construction activities.

#### **Mobilization**

Mobilization will be conducted as necessary for each phase of work at the Site. Mobilization includes field personnel orientation, equipment mobilization (including securing all sampling equipment needed for the field investigation), marking/staking sampling locations and utility mark-outs. Each field team member will attend an orientation meeting to become familiar with the general operation of the Site, health and safety requirements, and field procedures.

#### **Utility Marker Layouts, Easement Layouts**

The presence of utilities and easements on the Site will be fully investigated prior to the performance of invasive work such as excavation or drilling under this plan by using, at a minimum, the One-Call System (811). Underground utilities may pose an electrocution, explosion, or other hazard during excavation or drilling activities. All invasive activities will be performed in compliance with applicable laws and regulations to assure safety. Utility companies and other responsible authorities will be contacted to locate and mark the locations, and a copy of the Markout Ticket will be retained by the contractor prior to the start of drilling, excavation or other invasive subsurface operations. Overhead utilities may also be present within the anticipated work zones. Electrical hazards associated with drilling in the vicinity of overhead utilities will be prevented by maintaining a safe distance between overhead power lines and drill rig masts.

Proper safety and protective measures pertaining to utilities and easements, and compliance with all laws and regulations will be employed during invasive and other work contemplated under this RAP. The integrity and safety of on-Site and off-Site structures will be maintained during all invasive, excavation or other remedial activity performed under the RAP.

## **Dewatering**

If dewatering is required it will be performed in accordance with New York City Department of Environmental Protection (NYCDEP) regulations and a NYC Sewer Discharge Permit will be obtained prior to the start of dewatering activities. Extracted groundwater will either be containerized for off-Site disposal or be treated as necessary to meet NYCDEP requirements and discharged to the NYCDEP sewer system.

## **Equipment and Material Staging**

Equipment and materials will be stored and staged in a manner that complies with applicable laws and regulations.

## **Stabilized Construction Entrance**

Steps will be taken to ensure that trucks departing the site will not track soil, fill or debris off-Site. Such actions may include use of cleaned asphalt or concrete roads or use of stone or other aggregate-based egress paths between the truck inspection station and the property exit. Measures will be taken to ensure that adjacent roadways will be kept clean of project related soils, fill and debris.

## **Truck Inspection Station**

An outbound-truck inspection station will be set up close to the Site exit. Before exiting the Site, trucks will be required to stop at the truck inspection station and will be examined for evidence of contaminated soil on the undercarriage, body, and wheels. Soil and debris will be removed. Brooms, shovels and potable water will be utilized for the removal of soil from vehicles and equipment, as necessary.

### **3.8 Traffic Control**

Drivers of trucks leaving the Site with soil/fill will be instructed to proceed without stopping in the vicinity of the site to prevent neighborhood impacts. The planned route on local roads for trucks leaving the site is will be provided once disposal facilities have been determined.

### **3.9 Demobilization**

Demobilization will include:

- As necessary, restoration of temporary access areas and areas that may have been disturbed to accommodate support areas (e.g., staging areas, decontamination areas, storage areas, temporary water management areas, and access area);
- Removal of sediment from erosion control measures and truck wash and disposal of materials in accordance with applicable laws and regulations;
- Equipment decontamination, and;
- General refuse disposal.

Equipment will be decontaminated and demobilized at the completion of all field activities. Investigation equipment and large equipment (*e.g.*, soil excavators) will be washed at the truck inspection station as necessary. In addition, all investigation and remediation derived waste will be appropriately disposed.

### **3.10 Reporting and Record Keeping**

#### **Daily Reports**

Daily reports providing a general summary of activities for each day of *active remedial work* will be emailed to the OER Project Manager by the end of the following day. Those reports will include:

- Project number and statement of the activities and an update of progress made and locations of work performed;
- Quantities of material imported and exported from the Site;
- Status of on-Site soil/fill stockpiles;
- A summary of all citizen complaints, with relevant details (basis of complaint; actions taken; etc.);
- A summary of CAMP excursions, if any;
- Photograph of notable Site conditions and activities.

The frequency of the reporting period may be revised in consultation with OER project manager based on planned project tasks. Daily email reports are not intended to be the primary

mode of communication for notification to OER of emergencies (accidents, spills), requests for changes to the RAP or other sensitive or time critical information. However, such information will be included in the daily reports. Emergency conditions and changes to the RAP will be communicated directly to the OER project manager by personal communication. Daily reports will be included as an Appendix in the RCR.

### **Record Keeping and Photo-Documentation**

Job-site record keeping for all remedial work will be performed. These records will be maintained on-Site during the project and will be available for inspection by OER staff. Representative photographs will be taken of the Site prior to any remedial activities and during major remedial activities to illustrate remedial program elements and contaminant source areas. Photographs will be submitted at the completion of the project in the RCR in digital format (i.e. jpeg files).

### **3.11 Complaint Management**

All complaints from citizens will be promptly reported to OER. Complaints will be addressed and outcomes will also be reported to OER in daily reports. Notices to OER will include the nature of the complaint, the party providing the complaint, and the actions taken to resolve any problems.

### **3.12 Deviations from the Remedial Action Plan**

All changes to the RAP will be reported to the OER Project Manager and will be documented in daily reports and reported in the RCR. The process to be followed if there are any deviations from the RAP will include a request for approval for the change from OER noting the following:

- Reasons for deviating from the approved RAP;
- Effect of the deviations on overall remedy; and
- Determination that the remedial action with the deviation(s) is protective of public health and the environment.



## **4.0 REMEDIAL CLOSURE REPORT**

A Remedial Closure Report (RCR) will be submitted to OER following implementation of the remedial action defined in this RAP. The RCR will document that the remedial work required under this RAP has been completed and has been performed in compliance with this plan. The RCR will include:

- Information required by this RAP;
- As-built drawings for all constructed remedial elements, required certifications, manifests and other written and photographic documentation of remedial work performed under this remedy;
- Site Management Plan;
- Description of any changes in the remedial action from the elements provided in this RAP and associated design documents;
- Tabular summary of all end point sampling results and all material characterization results, QA/QC results for end-point sampling, and other sampling and chemical analysis performed as part of the remedial action;
- Test results or other evidence demonstrating that remedial systems are functioning properly;
- Account of the source area locations and characteristics of all contaminated material removed from the Site including a map showing source areas;
- Account of the disposal destination of all contaminated material removed from the Site. Documentation associated with disposal of all material will include transportation and disposal records, and letters approving receipt of the material.
- Account of the origin and required chemical quality testing for material imported onto the Site.
- Reports and supporting material will be submitted in digital form.

## **Remedial Closure Report Certification**

The following certification will appear in front of the Executive Summary of the Remedial Closure Report. The certification will include the following statements:

*I, Arnold F. Fleming, am currently a professional engineer licensed by the State of New York. I had primary direct responsibility for implementation of the remedial program for the 33-01 38<sup>th</sup> Avenue Site 12EHAZ013Q.*

*I, Arnold F. Fleming, am a qualified Environmental Professional. I had primary direct responsibility for implementation remedial program for the 33-01 38<sup>th</sup> Avenue Site 12EHAZ013Q.*

*I certify that the OER-approved Remedial Action Plan dated month day year and Stipulations in a letter dated month day, year; if any were implemented and that all requirements in those documents have been substantively complied with. I certify that contaminated soil, fill, liquids or other material from the property were taken to facilities licensed to accept this material in full compliance with applicable laws and regulations.*

## 5.0 SCHEDULE

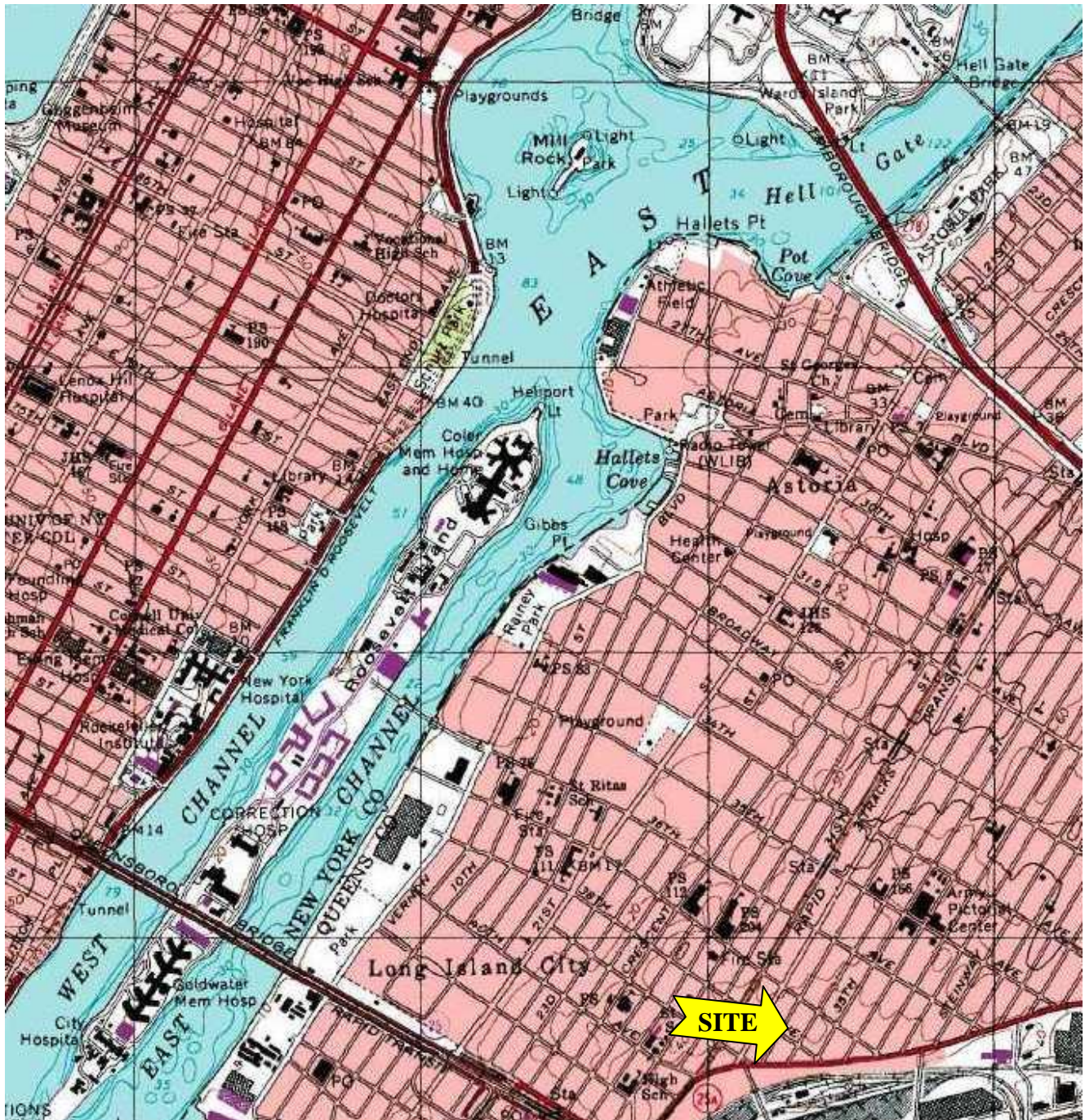
The table below presents a schedule for the proposed remedial action and reporting. If the schedule for remediation and development activities changes, it will be updated and submitted to OER. Currently, a 3 month remediation period is anticipated.

Schedule Milestone	Weeks from Remedial Action Start	Duration (weeks)
OER Approval of RAP	0	-
Mobilization	4	1
Excavation	5	3
Installation of SSDS	8	2
Demobilization	10	1
Submit Remedial Closure Report	12	-

# FIGURES







Central Park, NY Quadrangle 7.5 Minute Topographic Map, published by the USGS ©2013



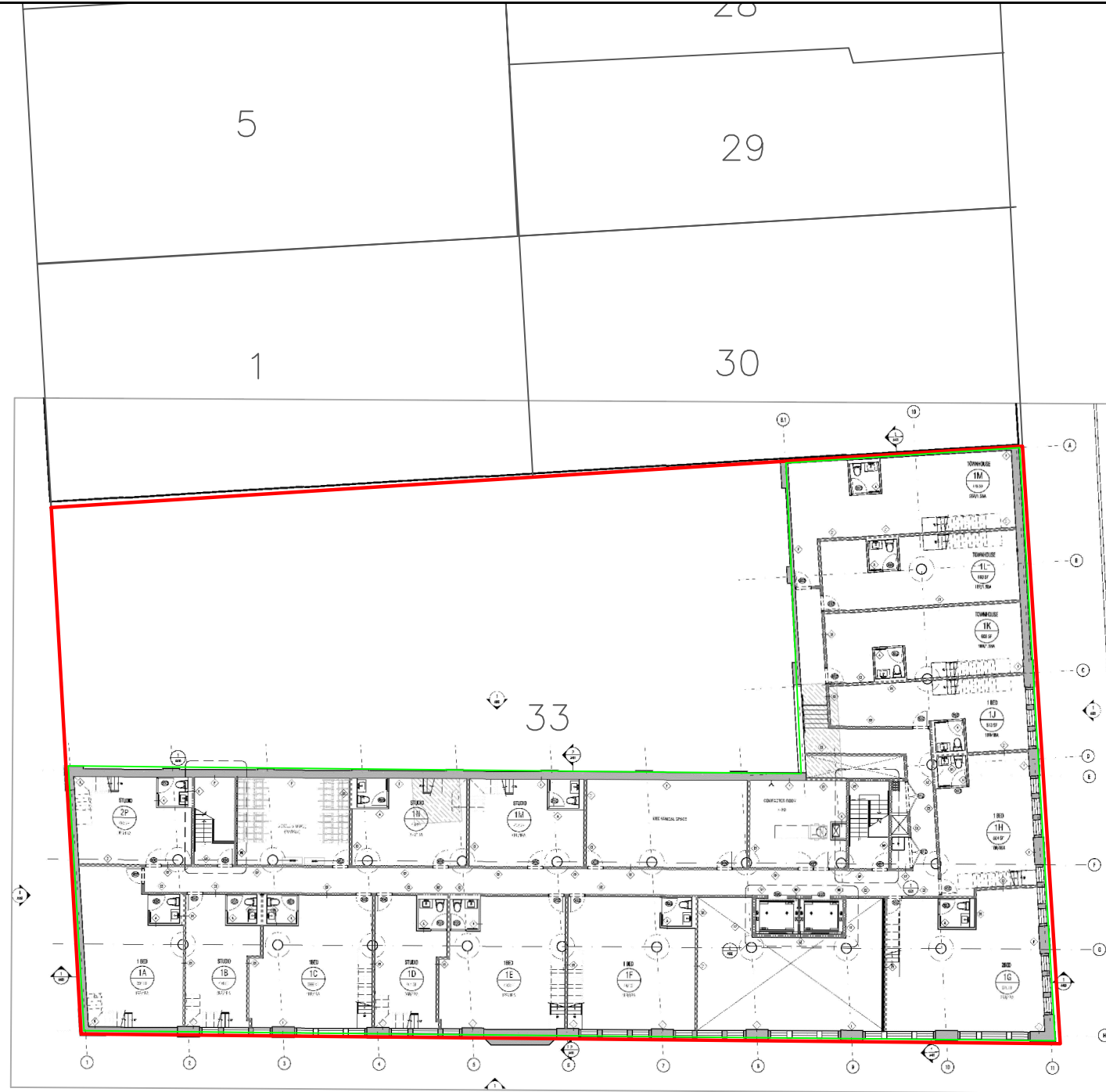
## FIGURE 1: SITE LOCATION MAP

SITE: 33-01 38<sup>th</sup> Avenue  
Queens, NY  
CLIENT: The Hakimian Organization

*Environmental Management & Consulting, 158 West 29<sup>th</sup> Street, 9<sup>th</sup> Fl., New York, NY 10001*

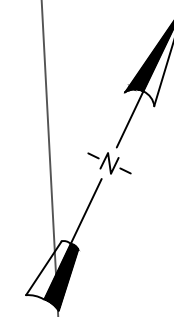


33 Street



38 Avenue

34 Street



Scale: 1" = 30'



*Environmental Management & Consulting*

158 West 29th Street, 9th Fl.  
New York, NY 10001

33-01 38th Avenue  
Queens, NY

## FIGURE 2

## SITE BOUNDARY AND PROPOSED RENOVATION LAYOUT

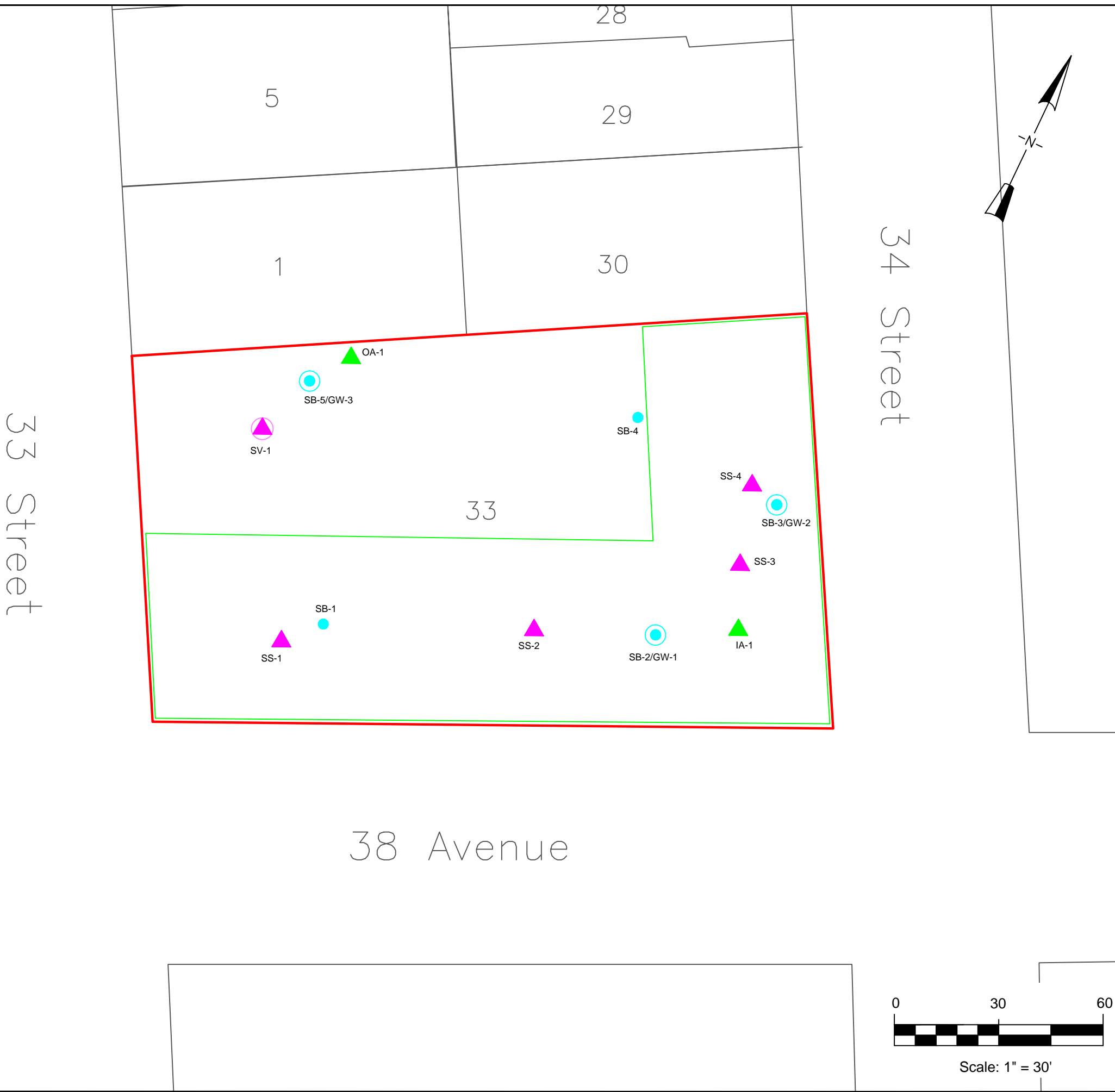
Date  
**December 2014**

Project Number  
**10058-009**

## LEGEND

- PROJECT BOUNDARY
- BUILDING OUTLINE

Note: Interior layout of cellar footprint  
represents usage of proposed  
renovation.



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158 West 29th Street, 9th Fl.  
New York, NY 10001

33-01 38th Avenue  
Queens, NY

FIGURE 3

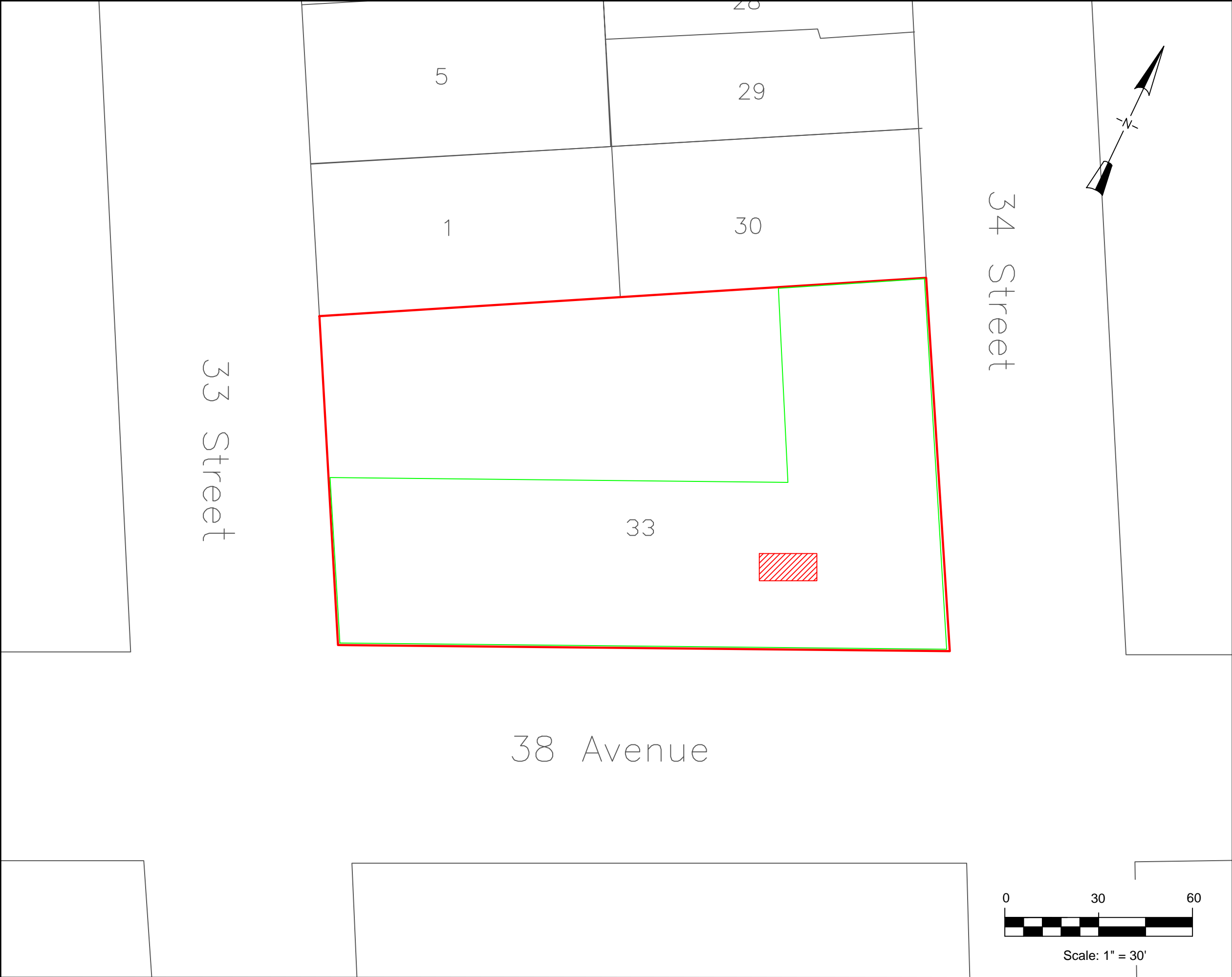
REMEDIAL  
INVESTIGATION  
SAMPLING  
LOCATIONS

Date  
December 2014

Project Number  
10058-009

LEGEND

- PROJECT BOUNDARY
- BUILDING OUTLINE
- SUB-SLAB VAPOR SAMPLE
- SOIL VAPOR SAMPLE
- AMBIENT AIR SAMPLE
- SOIL AND GROUNDWATER SAMPLE
- SOIL SAMPLE



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158 West 29th Street, 9th Fl.  
New York, NY 10001

33-01 38th Avenue  
Queens, NY




**FIGURE 4**

**EXCAVATION  
PLAN**

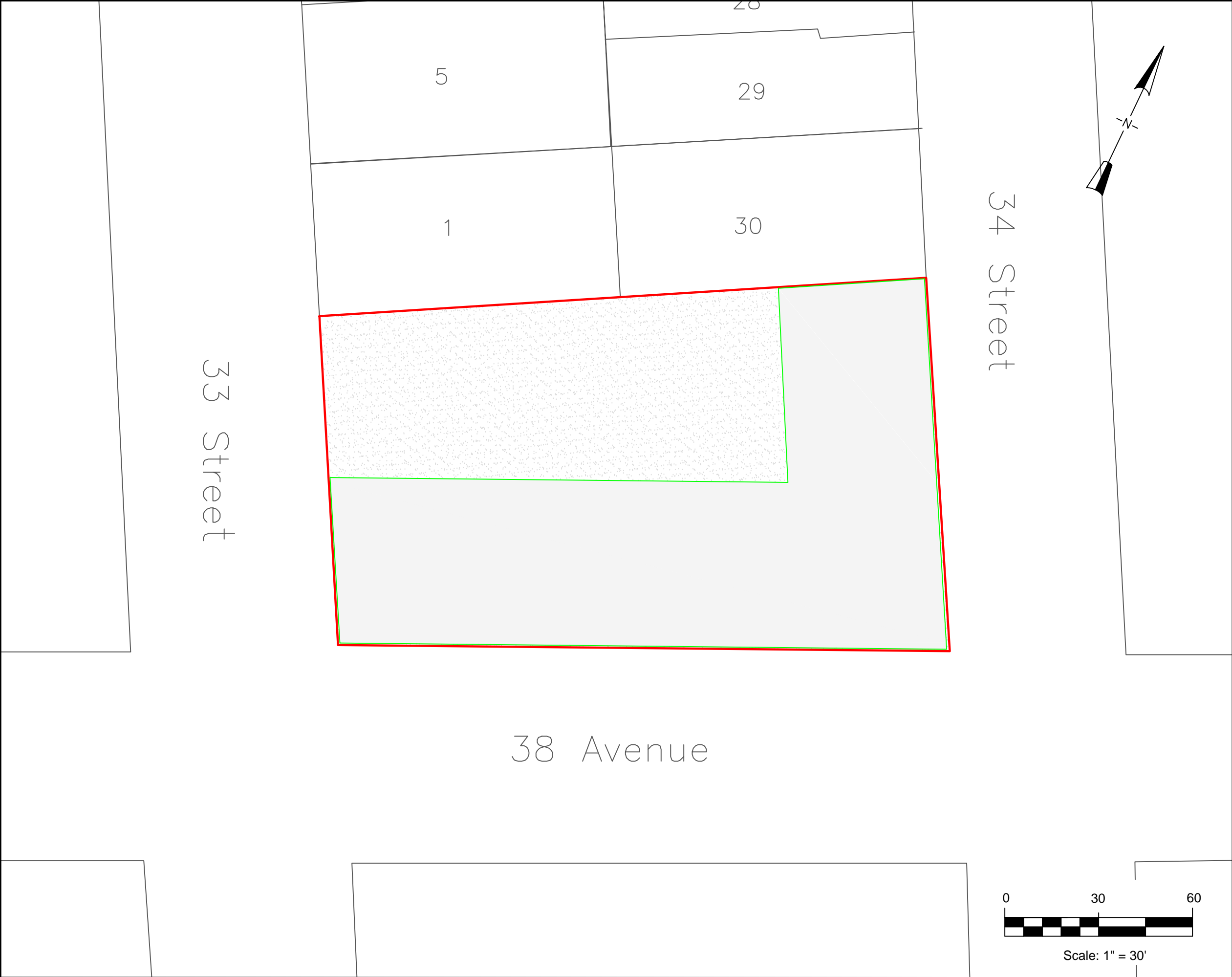
Date  
**January 2015**

Project Number  
**10058-009**

**LEGEND**

-  BUILDING OUTLINE
-  PROJECT BOUNDARY
-  EXCAVATION FOR ELEVATOR PIT





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New York, NY 10001

33-01 38th Avenue  
Queens, NY

## FIGURE 5

# COMPOSITE COVER SYSTEM

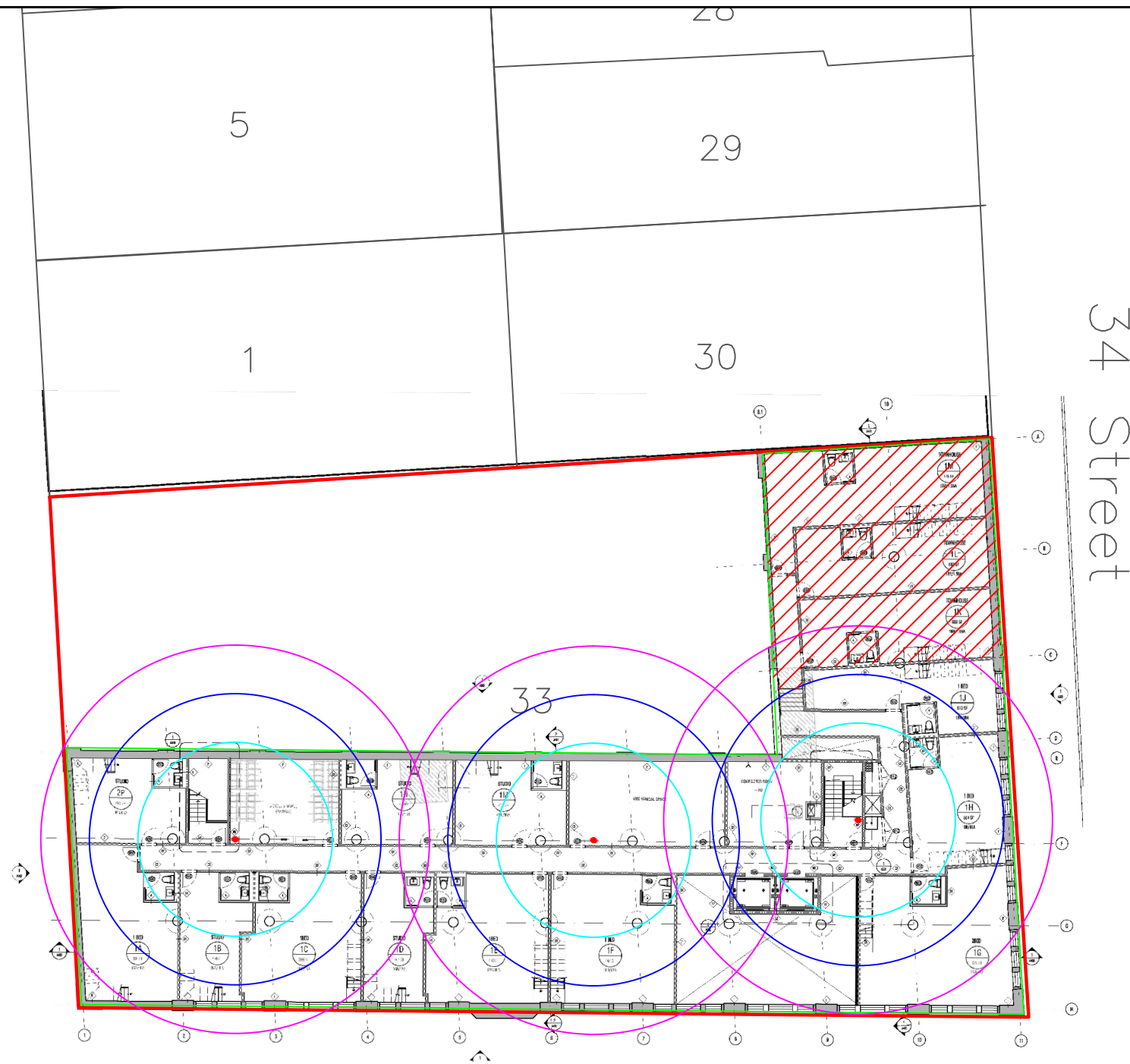
Date  
**January 2015**

Project Number  
**10058-009**

## LEGEND

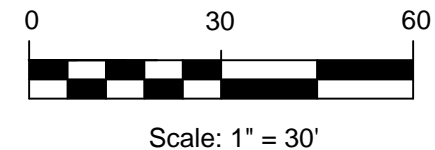
- BUILDING OUTLINE
- PROJECT BOUNDARY
- ASPHALT CAPPED  
PARKING LOT
- CONCRETE BUILDING  
SLAB

33 Street



38 Avenue

34 Street



*Environmental Management & Consulting*

158 West 29th Street, 9th Fl.  
New York, NY 10001

33-01 38th Avenue  
Queens, NY

## FIGURE 6

### SSDS PRELIMINARY LAYOUT AND VAPOR BARRIER PLAN

Date  
**February 2015**

Project Number  
**10058-009**

### LEGEND

- PROJECT BOUNDARY
- BUILDING OUTLINE
- POTENTIAL SSDS PIT
- 20-FOOT INFLUENCE
- 30-FOOT INFLUENCE
- 40-FOOT INFLUENCE
- 20-MIL VAPOR BARRIER BENEATH NEW SLAB

Note: Interior layout of cellar footprint represents usage of proposed renovation.

# TABLES



Table 1 - Volatile Organic Compounds in Soil  
33-01 38th Avenue, Queens, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Restricted Residential Use (6 NYCRR 375-6 12/06)	SB-1(12-14)	SB-1(6-8)	SB-2(12-14)	SB-2(6-8)	SB-3(12-14)	SB-3(6-8)	SB-4(2-4)	SB-4(12-14)	SB-5(0-2)	SB-5(4-6)
Lab Sample ID:				JB84101-2	JB84101-1	JB84101-4	JB84101-3	JB84101-6	JB84101-5	JB84101-7	JB84101-8	JB84101-9	JB84101-10
Date Sampled:				12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014
Matrix:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
GC/MS Volatiles (SW846 8260C)													
Acetone	ug/kg	50	100000	ND (1.4)	ND (1.8)	ND (1.7)	ND (1.4)	ND (1.6)	3.9 J	ND (1.6)	ND (1.6)	ND (1.7)	ND (1.7)
Benzene	ug/kg	60	4800	ND (0.17)	ND (0.21)	ND (0.20)	ND (0.16)	ND (0.19)	ND (0.20)	ND (0.18)	ND (0.19)	ND (0.20)	ND (0.20)
Bromochloromethane	ug/kg	-	-	ND (0.23)	ND (0.30)	ND (0.28)	ND (0.22)	ND (0.27)	ND (0.28)	ND (0.26)	ND (0.26)	ND (0.28)	ND (0.28)
Bromodichloromethane	ug/kg	-	-	ND (0.23)	ND (0.30)	ND (0.28)	ND (0.22)	ND (0.27)	ND (0.28)	ND (0.26)	ND (0.26)	ND (0.28)	ND (0.28)
Bromoform	ug/kg	-	-	ND (0.10)	ND (0.13)	ND (0.12)	ND (0.098)	ND (0.12)	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.12)	ND (0.12)
Bromomethane	ug/kg	-	-	ND (0.28)	ND (0.36)	ND (0.33)	ND (0.27)	ND (0.32)	ND (0.34)	ND (0.31)	ND (0.31)	ND (0.34)	ND (0.34)
2-Butanone (MEK)	ug/kg	120	100000	ND (1.2)	ND (1.5)	ND (1.4)	ND (1.1)	ND (1.3)	ND (1.4)	ND (1.3)	ND (1.3)	ND (1.4)	ND (1.4)
Carbon disulfide	ug/kg	-	-	ND (0.23)	ND (0.29)	ND (0.27)	ND (0.22)	ND (0.26)	ND (0.28)	ND (0.25)	ND (0.25)	ND (0.28)	ND (0.27)
Carbon tetrachloride	ug/kg	760	2400	ND (0.14)	ND (0.17)	ND (0.16)	ND (0.13)	ND (0.16)	ND (0.17)	ND (0.15)	ND (0.15)	ND (0.17)	ND (0.16)
Chlorobenzene	ug/kg	1100	100000	ND (0.12)	ND (0.15)	ND (0.14)	ND (0.11)	ND (0.13)	ND (0.14)	ND (0.13)	ND (0.13)	ND (0.14)	ND (0.14)
Chloroethane	ug/kg	-	-	ND (0.23)	ND (0.29)	ND (0.27)	ND (0.22)	ND (0.26)	ND (0.28)	ND (0.25)	ND (0.25)	ND (0.28)	ND (0.28)
Chloroform	ug/kg	370	49000	ND (0.10)	ND (0.13)	ND (0.12)	ND (0.095)	ND (0.11)	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.12)	ND (0.12)
Chloromethane	ug/kg	-	-	ND (0.29)	ND (0.37)	ND (0.34)	ND (0.28)	ND (0.33)	ND (0.35)	ND (0.32)	ND (0.32)	ND (0.35)	ND (0.35)
Cyclohexane	ug/kg	-	-	ND (0.34)	ND (0.43)	ND (0.41)	ND (0.33)	ND (0.39)	ND (0.41)	ND (0.37)	ND (0.38)	ND (0.42)	ND (0.41)
1,2-Dibromo-3-chloropropane	ug/kg	-	-	ND (0.51)	ND (0.64)	ND (0.60)	ND (0.48)	ND (0.57)	ND (0.61)	ND (0.55)	ND (0.56)	ND (0.61)	ND (0.61)
Dibromochloromethane	ug/kg	-	-	ND (0.13)	ND (0.17)	ND (0.15)	ND (0.12)	ND (0.15)	ND (0.16)	ND (0.14)	ND (0.14)	ND (0.16)	ND (0.16)
1,2-Dibromoethane	ug/kg	-	-	ND (0.15)	ND (0.19)	ND (0.18)	ND (0.14)	ND (0.17)	ND (0.18)	ND (0.16)	ND (0.17)	ND (0.18)	ND (0.18)
1,2-Dichlorobenzene	ug/kg	1100	100000	ND (0.16)	ND (0.20)	ND (0.18)	ND (0.15)	ND (0.18)	ND (0.19)	ND (0.17)	ND (0.17)	ND (0.19)	ND (0.19)
1,3-Dichlorobenzene	ug/kg	2400	49000	ND (0.15)	ND (0.19)	ND (0.18)	ND (0.14)	ND (0.17)	ND (0.18)	ND (0.17)	ND (0.17)	ND (0.18)	ND (0.18)
1,4-Dichlorobenzene	ug/kg	1800	13000	ND (0.16)	ND (0.20)	ND (0.19)	ND (0.15)	ND (0.18)	ND (0.19)	ND (0.18)	ND (0.18)	ND (0.19)	ND (0.19)
Dichlorodifluoromethane	ug/kg	-	-	ND (0.51)	ND (0.64)	ND (0.60)	ND (0.48)	ND (0.57)	ND (0.61)	ND (0.55)	ND (0.56)	ND (0.61)	ND (0.60)
1,1-Dichloroethane	ug/kg	270	26000	ND (0.35)	ND (0.44)	ND (0.41)	ND (0.33)	ND (0.39)	ND (0.42)	ND (0.38)	ND (0.38)	ND (0.42)	ND (0.42)
1,2-Dichloroethane	ug/kg	20	3100	ND (0.11)	ND (0.14)	ND (0.13)	ND (0.11)	ND (0.13)	ND (0.13)	ND (0.12)	ND (0.12)	ND (0.14)	ND (0.13)
1,1-Dichloroethene	ug/kg	330	100000	ND (0.24)	ND (0.30)	ND (0.28)	ND (0.23)	ND (0.27)	ND (0.29)	ND (0.26)	ND (0.26)	ND (0.29)	ND (0.28)
cis-1,2-Dichloroethene	ug/kg	250	100000	ND (0.25)	ND (0.32)	ND (0.30)	ND (0.24)	ND (0.29)	ND (0.30)	ND (0.28)	ND (0.28)	ND (0.31)	ND (0.30)
trans-1,2-Dichloroethene	ug/kg	190	100000	ND (0.18)	ND (0.23)	ND (0.22)	ND (0.17)	ND (0.21)	ND (0.22)	ND (0.20)	ND (0.20)	ND (0.22)	ND (0.22)
1,2-Dichloropropane	ug/kg	-	-	ND (0.17)	ND (0.21)	ND (0.20)	ND (0.16)	ND (0.19)	ND (0.20)	ND (0.18)	ND (0.18)	ND (0.20)	ND (0.20)
cis-1,3-Dichloropropene	ug/kg	-	-	ND (0.12)	ND (0.16)	ND (0.15)	ND (0.12)	ND (0.14)	ND (0.15)	ND (0.13)	ND (0.14)	ND (0.15)	ND (0.15)
trans-1,3-Dichloropropene	ug/kg	-	-	ND (0.16)	ND (0.21)	ND (0.19)	ND (0.16)	ND (0.19)	ND (0.20)	ND (0.18)	ND (0.18)	ND (0.20)	ND (0.20)
Ethylbenzene	ug/kg	1000	41000	ND (0.10)	ND (0.13)	ND (0.12)	ND (0.098)	ND (0.12)	ND (0.12)	ND (0.11)	ND (0.11)	ND (0.12)	ND (0.12)
Freon 113	ug/kg	-	-	ND (0.28)	ND (0.35)	ND (0.33)	ND (0.26)	ND (0.32)	ND (0.34)	ND (0.30)	ND (0.31)	ND (0.34)	ND (0.33)
2-Hexanone	ug/kg	-	-	ND (0.54)	ND (0.68)	ND (0.64)	ND (0.51)	ND (0.61)	ND (0.65)	ND (0.59)	ND (0.60)	ND (0.65)	ND (0.65)
Isopropylbenzene	ug/kg	-	-	ND (0.15)	ND (0.19)	ND (0.18)	ND (0.14)	ND (0.17)	ND (0.18)	ND (0.16)	ND (0.16)	ND (0.18)	ND (0.18)
Methyl Acetate	ug/kg	-	-	ND (0.47)	ND (0.59)	ND (0.56)	ND (0.45)	ND (0.53)	ND (0.57)	ND (0.51)	ND (0.52)	ND (0.57)	ND (0.56)
Methylcyclohexane	ug/kg	-	-	ND (0.13)	ND (0.17)	ND (0.16)	ND (0.13)	ND (0.15)	ND (0.16)	ND (0.15)	ND (0.15)	ND (0.16)	ND (0.16)
Methyl Tert Butyl Ether	ug/kg	930	100000	ND (0.16)	ND (0.20)	ND (0.19)	ND (0.15)	ND (0.18)	ND (0.19)	ND (0.18)	ND (0.18)	ND (0.20)	ND (0.19)
4-Methyl-2-pentanone(MIBK)	ug/kg	-	-	ND (0.31)	ND (0.39)	ND (0.37)	ND (0.30)	ND (0.35)	ND (0.37)	ND (0.34)	ND (0.34)	ND (0.38)	ND (0.37)
Methylene chloride	ug/kg	50	100000	1.9 J	2.7 J	2.3 J	1.7 J	ND (1.0)	2.0 J	ND (1.0)	ND (1.0)	1.8 J	ND (1.1)
Styrene	ug/kg	-	-	ND (0.14)	ND (0.17)	ND (0.16)	ND (0.13)	ND (0.15)	ND (0.16)	ND (0.15)	ND (0.15)	ND (0.16)	ND (0.16)
1,1,2,2-Tetrachloroethane	ug/kg	-	-	ND (0.14)	ND (0.18)	ND (0.17)	ND (0.13)	ND (0.16)	ND (0.17)	ND (0.15)	ND (0.16)	ND (0.17)	ND (0.17)
Tetrachloroethene	ug/kg	1300	19000	0.20 J	ND (0.24)	ND (0.22)	ND (0.18)	0.33 J	1.7 J	0.26 J	ND (0.21)	0.57 J	0.57 J
Toluene	ug/kg	700	100000	ND (0.15)	ND (0.18)	ND (0.17)	ND (0.14)	ND (0.16)	ND (0.17)	ND (0.16)	ND (0.16)	ND (0.18)	ND (0.17)
1,2,3-Trichlorobenzene	ug/kg	-	-	ND (0.15)	ND (0.19)	ND (0.17)	ND (0.14)	ND (0.17)	ND (0.18)	ND (0.16)	ND (0.16)	ND (0.18)	ND (0.18)
1,2,4-Trichlorobenzene	ug/kg	-	-	ND (0.18)	ND (0.22)	ND (0.21)	ND (0.17)	ND (0.20)	ND (0.21)	ND (0.19)	ND (0.19)	ND (0.21)	ND (0.21)
1,1,1-Trichloroethane	ug/kg	680	100000	ND (0.13)	ND (0.16)	ND (0.15)	ND (0.12)	ND (0.15)	ND (0.16)	ND (0.14)	ND (0.14)	ND (0.16)	ND (0.15)
1,1,2-Trichloroethane	ug/kg	-	-	ND (0.17)	ND (0.22)	ND (0.21)	ND (0.17)	ND (0.20)	ND (0.21)	ND (0.19)	ND (0.19)	ND (0.21)	ND (0.21)
Trichloroethene	ug/kg	470	21000	ND (0.19)	ND (0.24)	ND (0.22)	ND (0.18)	ND (0.22)	ND (0.23)	ND (0.21)	ND (0.21)	ND (0.23)	ND (0.23)
Trichlorofluoromethane	ug/kg	-	-	ND (0.16)	ND (0.20)	ND (0.19)	ND (0.15)	ND (0.18)	ND (0.19)	ND (0.18)	ND (0.18)	ND (0.20)	ND (0.19)
Vinyl chloride	ug/kg	20	900	ND (0.14)	ND (0.17)	ND (0.16)	ND (0.13)	ND (0.16)	ND (0.16)	ND (0.15)	ND (0.15)	ND (0.17)	ND (0.16)
m,p-Xylene	ug/kg	260	100000	ND (0.22)	ND (0.28)	ND (0.26)	ND (0.21)	ND (0.25)	ND (0.26)	ND (0.24)	ND (0.24)	ND (0.27)	ND (0.26)
o-Xylene	ug/kg	260	100000	ND (0.14)	ND (0.17)	ND (0.16)	ND (0.13)	ND (0.16)	ND (0.16)	ND (0.15)	ND (0.15)	ND (0.17)	ND (0.16)
Xylene (total)	ug/kg	260	100000	ND (0.14)	ND (0.17)	ND (0.16)	ND (0.13)	ND (0.16)	ND (0.16)	ND (0.15)	ND (0.15)	ND (0.17)	ND (0.16)

Legend:	Hit	Exceeds UUSCO	Exceed RRSCO
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Table 2 - Semi-Volatile Organic Compounds in Soil  
33-01 38th Avenue, Queens, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Restricted Residential Use (6 NYCRR 375-6 12/06)	SB-1(12-14)	SB-1(6-8)	SB-2(12-14)	SB-2(6-8)	SB-3(12-14)	SB-3(6-8)	SB-4(2-4)	SB-4(12-14)	SB-5(0-2)	SB-5(4-6)
Lab Sample ID:				JB84101-2	JB84101-1	JB84101-4	JB84101-3	JB84101-6	JB84101-5	JB84101-7	JB84101-8	JB84101-9	JB84101-10
Date Sampled:				12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014
Matrix:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
GC/MS Semi-volatiles (SW846 8270D)													
2-Chlorophenol	ug/kg	-	-	ND (35)	ND (37)	ND (37)	ND (36)	ND (34)	ND (35)	ND (36)	ND (34)	ND (38)	ND (36)
4-Chloro-3-methyl phenol	ug/kg	-	-	ND (35)	ND (37)	ND (37)	ND (36)	ND (34)	ND (35)	ND (36)	ND (34)	ND (38)	ND (36)
2,4-Dichlorophenol	ug/kg	-	-	ND (56)	ND (59)	ND (60)	ND (58)	ND (55)	ND (57)	ND (58)	ND (54)	ND (61)	ND (57)
2,4-Dimethylphenol	ug/kg	-	-	ND (58)	ND (62)	ND (63)	ND (61)	ND (57)	ND (59)	ND (61)	ND (57)	ND (63)	ND (60)
2,4-Dinitrophenol	ug/kg	-	-	ND (42)	ND (45)	ND (46)	ND (44)	ND (42)	ND (43)	ND (44)	ND (41)	ND (46)	ND (43)
4,6-Dinitro-o-cresol	ug/kg	-	-	ND (42)	ND (45)	ND (46)	ND (44)	ND (42)	ND (43)	ND (44)	ND (41)	ND (46)	ND (43)
2-Methylphenol	ug/kg	330	100000	ND (39)	ND (42)	ND (43)	ND (41)	ND (39)	ND (40)	ND (41)	ND (38)	ND (43)	ND (41)
3&4-Methylphenol	ug/kg	-	-	ND (44)	ND (47)	ND (48)	ND (46)	ND (43)	ND (45)	ND (46)	ND (43)	ND (48)	ND (45)
2-Nitrophenol	ug/kg	-	-	ND (37)	ND (39)	ND (40)	ND (38)	ND (36)	ND (37)	ND (38)	ND (36)	ND (40)	ND (38)
4-Nitrophenol	ug/kg	-	-	ND (58)	ND (62)	ND (63)	ND (61)	ND (58)	ND (60)	ND (61)	ND (57)	ND (64)	ND (60)
Pentachlorophenol	ug/kg	800	6700	ND (59)	ND (63)	ND (64)	ND (62)	ND (58)	ND (60)	ND (62)	ND (58)	ND (64)	ND (61)
Phenol	ug/kg	330	100000	ND (36)	ND (39)	ND (39)	ND (38)	ND (36)	ND (37)	ND (38)	ND (35)	ND (40)	ND (37)
2,3,4,6-Tetrachlorophenol	ug/kg	-	-	ND (36)	ND (38)	ND (39)	ND (37)	ND (35)	ND (36)	ND (37)	ND (35)	ND (39)	ND (37)
2,4,5-Trichlorophenol	ug/kg	-	-	ND (40)	ND (43)	ND (43)	ND (42)	ND (40)	ND (41)	ND (42)	ND (39)	ND (44)	ND (41)
2,4,6-Trichlorophenol	ug/kg	-	-	ND (33)	ND (35)	ND (35)	ND (34)	ND (32)	ND (33)	ND (34)	ND (32)	ND (35)	ND (33)
Acenaphthene	ug/kg	20000	100000	ND (10)	ND (11)	ND (11)	ND (11)	ND (9.9)	ND (10)	ND (11)	21.4 J	ND (11)	ND (10)
Acenaphthylene	ug/kg	100000	100000	ND (11)	ND (12)	ND (12)	ND (12)	ND (11)	ND (11)	ND (12)	ND (11)	ND (12)	ND (11)
Acetophenone	ug/kg	-	-	ND (6.1)	ND (6.5)	ND (6.6)	ND (6.4)	ND (6.0)	ND (6.2)	ND (6.4)	ND (5.9)	ND (6.6)	ND (6.3)
Anthracene	ug/kg	100000	100000	ND (12)	ND (13)	ND (13)	ND (13)	ND (12)	ND (12)	27.6 J	33.6 J	ND (13)	ND (12)
Atrazine	ug/kg	-	-	ND (6.8)	ND (7.2)	ND (7.4)	ND (7.2)	ND (6.7)	ND (7.0)	ND (7.1)	ND (6.6)	ND (7.4)	ND (7.0)
Benzo(a)anthracene	ug/kg	1000	1000	ND (11)	ND (12)	ND (12)	ND (12)	ND (11)	ND (12)	127	117	ND (12)	ND (12)
Benzo(a)pyrene	ug/kg	1000	1000	ND (11)	ND (11)	ND (11)	ND (11)	ND (10)	ND (11)	147	152	ND (11)	ND (11)
Benzo(b)fluoranthene	ug/kg	1000	1000	ND (12)	ND (12)	ND (13)	ND (12)	ND (11)	ND (12)	133	170	ND (13)	ND (12)
Benzo(g,h,i)perylene	ug/kg	100000	100000	ND (13)	ND (14)	ND (14)	ND (14)	ND (13)	ND (13)	105	128	ND (14)	ND (13)
Benzo(k)fluoranthene	ug/kg	800	3900	ND (13)	ND (14)	ND (14)	ND (14)	ND (13)	ND (13)	108	107	ND (14)	ND (13)
4-Bromophenyl phenyl ether	ug/kg	-	-	ND (13)	ND (13)	ND (14)	ND (13)	ND (12)	ND (13)	ND (13)	ND (12)	ND (14)	ND (13)
Butyl benzyl phthalate	ug/kg	-	-	ND (20)	ND (21)	ND (22)	ND (21)	ND (20)	ND (20)	ND (21)	ND (19)	ND (22)	ND (21)
1,1'-Biphenyl	ug/kg	-	-	ND (4.0)	ND (4.3)	ND (4.3)	ND (4.2)	ND (4.0)	ND (4.1)	ND (4.2)	ND (3.9)	ND (4.4)	ND (4.1)
Benzaldehyde	ug/kg	-	-	ND (8.0)	ND (8.4)	ND (8.6)	ND (8.4)	ND (7.9)	ND (8.1)	ND (8.3)	ND (7.7)	ND (8.7)	ND (8.2)
2-Chloronaphthalene	ug/kg	-	-	ND (11)	ND (11)	ND (12)	ND (11)	ND (11)	ND (11)	ND (11)	ND (10)	ND (12)	ND (11)
4-Chloroaniline	ug/kg	-	-	ND (11)	ND (12)	ND (12)	ND (12)	ND (11)	ND (11)	ND (12)	ND (11)	ND (12)	ND (11)
Carbazole	ug/kg	-	-	ND (16)	ND (17)	ND (17)	ND (17)	ND (16)	ND (16)	ND (17)	16.6 J	ND (17)	ND (16)
Caprolactam	ug/kg	-	-	ND (11)	ND (12)	ND (12)	ND (11)	ND (11)	30.2 J	ND (11)	ND (11)	ND (12)	ND (11)
Chrysene	ug/kg	1000	3900	ND (12)	ND (12)	ND (13)	ND (12)	ND (12)	ND (12)	137	147	ND (13)	ND (12)
bis(2-Chloroethoxy)methane	ug/kg	-	-	ND (14)	ND (15)	ND (15)	ND (15)	ND (14)	ND (14)	ND (15)	ND (14)	ND (15)	ND (14)
bis(2-Chloroethyl)ether	ug/kg	-	-	ND (10)	ND (11)	ND (11)	ND (11)	ND (10)	ND (11)	ND (11)	ND (10)	ND (11)	ND (11)
bis(2-Chloroisopropyl)ether	ug/kg	-	-	ND (10)	ND (11)	ND (11)	ND (11)	ND (10)	ND (11)	ND (11)	ND (10)	ND (11)	ND (11)
4-Chlorophenyl phenyl ether	ug/kg	-	-	ND (10)	ND (11)	ND (11)	ND (11)	ND (10)	ND (11)	ND (11)	ND (10)	ND (11)	ND (11)
2,4-Dinitrotoluene	ug/kg	-	-	ND (15)	ND (16)	ND (16)	ND (16)	ND (15)	ND (15)	ND (16)	ND (15)	ND (16)	ND (16)
2,6-Dinitrotoluene	ug/kg	-	-	ND (13)	ND (14)	ND (14)	ND (14)	ND (13)	ND (13)	ND (14)	ND (13)	ND (14)	ND (14)
3,3'-Dichlorobenzidine	ug/kg	-	-	ND (8.8)	ND (9.3)	ND (9.5)	ND (9.2)	ND (8.7)	ND (9.0)	ND (9.2)	ND (8.6)	ND (9.6)	ND (9.0)
1,4-Dioxane	ug/kg	100	13000	ND (22)	ND (24)	ND (24)	ND (24)	ND (22)	ND (23)	ND (24)	ND (22)	ND (24)	ND (23)
Dibenzo(a,h)anthracene	ug/kg	330	330	ND (12)	ND (13)	ND (13)	ND (12)	ND (12)	ND (12)	19.3 J	25.9 J	ND (13)	ND (12)
Dibenzofuran	ug/kg	7000	59000	ND (10)	ND (11)	ND (11)	ND (11)	ND (10)	ND (11)	ND (11)	ND (10)	ND (11)	ND (11)
Di-n-butyl phthalate	ug/kg	-	-	ND (7.7)	ND (8.2)	ND (8.3)	ND (8.1)	ND (7.6)	ND (7.9)	ND (8.1)	ND (7.5)	ND (8.4)	ND (7.9)
Di-n-octyl phthalate	ug/kg	-	-	ND (17)	ND (18)	ND (18)	ND (18)	ND (17)	ND (17)	ND (18)	ND (16)	ND (18)	ND (17)
Diethyl phthalate	ug/kg	-	-	ND (12)	ND (13)	ND (13)	ND (12)	ND (12)	ND (12)	ND (12)	ND (11)	ND (13)	ND (12)
Dimethyl phthalate	ug/kg	-	-	ND (12)	ND (13)	ND (13)	ND (13)	ND (12)	ND (12)	ND (13)	ND (12)	ND (13)	ND (13)
bis(2-Ethylhexyl)phthalate	ug/kg	-	-	ND (31)	ND (32)	93	138	178	1850	ND (32)	ND (30)	ND (33)	ND (31)
Fluoranthene	ug/kg	100000	100000	ND (15)	ND (16)	ND (17)	ND (16)	ND (15)	ND (16)	256	237	ND (17)	ND (16)
Fluorene	ug/kg	30000	100000	ND (11)	ND (12)	ND (12)	ND (11)	ND (12)	ND (12)	ND (12)	13.6 J	ND (12)	ND (12)
Hexachlorobenzene	ug/kg	330	1200	ND (11)	ND (12)	ND (12)	ND (12)	ND (11)	ND (12)	ND (12)	ND (11)	ND (12)	ND (12)
Hexachlorobutadiene	ug/kg	-	-	ND (9.6)	ND (10)	ND (10)	ND (10)	ND (9.5)	ND (9.8)	ND (10)	ND (9.4)	ND (10)	ND (9.9)
Hexachlorocyclopentadiene	ug/kg	-	-	ND (35)	ND (37)	ND (38)	ND (37)	ND (35)	ND (36)	ND (37)	ND (34)	ND (38)	ND (36)
Hexachloroethane	ug/kg	-	-	ND (9.6)	ND (10)	ND (10)	ND (10)	ND (9.5)	ND (9.8)	ND (10)	ND (9.4)	ND (10)	ND (9.9)
Indeno(1,2,3-cd)pyrene	ug/kg	500	500	ND (12)	ND (13)	ND (13)	ND (13)	ND (12)	ND (12)	80.9	105	ND (13)	ND (12)
Isophorone	ug/kg	-	-	ND (9.3)	ND (9.9)	ND (10)	ND (9.8)	ND (9.2)	ND (9.5)	ND (9.8)	ND (9.1)	ND (10)	ND (9.6)
2-Methylnaphthalene	ug/kg	-	-	ND (19)	ND (20)	ND (21)	ND (20)	ND (19)	ND (20)	ND (20)	ND (19)	ND (21)	ND (20)
2-Nitroaniline	ug/kg	-	-	ND (15)	ND (16)	ND (16)	ND (15)	ND (15)	ND (16)	ND (16)	ND (15)	ND (17)	ND (16)
3-Nitroaniline	ug/kg	-	-	ND (14)	ND (15)	ND (15)	ND (15)	ND (14)	ND (14)	ND (15)	ND (13)	ND (15)	ND (14)
4-Nitroaniline	ug/kg	-	-	ND (13)	ND (14)	ND (15)	ND (14)	ND (13)	ND (14)	ND (14)	ND (13)	ND (15)	ND (14)
Naphthalene	ug/kg	12000	100000	ND (9.4)	ND (10)	ND (10)	ND (9.9)	ND (9.3)	ND (9.7)	ND (9.9)	ND (9.2)	ND (10)	ND (9.7)
Nitrobenzene	ug/kg	-	15000	ND (10)	ND (11)	ND (11)	ND (10)	ND (9.9)	ND (10)	ND (10)	ND (9.7)	ND (11)	ND (10)
N-Nitroso-di-n-propylamine	ug/kg	-	-	ND (8.4)	ND (9.0)	ND (9.1)	ND (8.9)	ND (8.3)	ND (8.6)	ND (8.9)	ND (8.2)	ND (9.2)	ND (8.7)
N-Nitrosodiphenylamine	ug/kg	-	-	ND (21)	ND (22)	ND (22)	ND (22)	ND (20)	ND (21)	ND (22)	ND (20)	ND (22)	ND (21)
Phenanthrene	ug/kg	100000	100000	ND (16)	ND (17)	ND (17)	ND (17)	ND (16)	ND (16)	149	160	ND (17)	ND (16)
Pyrene	ug/kg	100000	100000	ND (13)	ND (14)	ND (14)	ND (14)	ND (13)	ND (14)	267	228	ND (14)	ND (14)
1,2,4,5-Tetrachlorobenzene	ug/kg	-	-	ND (11)	ND (11)	ND (12)	ND (11)	ND (11)	ND (11)	ND (11)	ND (10)	ND (12)	ND (11)

Legend:	Hit	Exceeds UUSCO	Exceed RRSCO
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Table 3 - Pesticides and PCBs in Soil  
33-01 38th Avenue, Queens, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Restricted Residential Use (6 NYCRR 375-6 12/06)	SB-1(12-14)	SB-1(6-8)	SB-2(12-14)	SB-2(6-8)	SB-3(12-14)	SB-3(6-8)	SB-4(2-4)	SB-4(12-14)	SB-5(0-2)	SB-5(4-6)
Lab Sample ID:				JB84101-2	JB84101-1	JB84101-4	JB84101-3	JB84101-6	JB84101-5	JB84101-7	JB84101-8	JB84101-9	JB84101-10
Date Sampled:				12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014
Matrix:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
<b>GC Semi-volatiles (SW846 8081B)</b>													
Aldrin	ug/kg	5	97	ND (0.29)	ND (0.34)	ND (0.31)	ND (0.32)	ND (0.31)	ND (0.34)	ND (0.29)	ND (0.34)	ND (0.31)	ND (0.29)
alpha-BHC	ug/kg	20	480	ND (0.19)	ND (0.22)	ND (0.20)	ND (0.21)	ND (0.20)	ND (0.22)	ND (0.19)	ND (0.22)	ND (0.20)	ND (0.19)
beta-BHC	ug/kg	36	360	ND (0.39)	ND (0.46)	ND (0.42)	ND (0.43)	ND (0.42)	ND (0.47)	ND (0.39)	ND (0.46)	ND (0.43)	ND (0.40)
delta-BHC	ug/kg	40	100000	ND (0.31)	ND (0.36)	ND (0.34)	ND (0.34)	ND (0.33)	ND (0.37)	ND (0.31)	ND (0.37)	ND (0.34)	ND (0.31)
gamma-BHC (Lindane)	ug/kg	100	1300	ND (0.31)	ND (0.36)	ND (0.33)	ND (0.34)	ND (0.33)	ND (0.37)	ND (0.31)	ND (0.36)	ND (0.34)	ND (0.31)
alpha-Chlordane	ug/kg	94	4200	ND (0.23)	ND (0.27)	ND (0.25)	ND (0.26)	ND (0.25)	ND (0.28)	ND (0.23)	ND (0.27)	ND (0.25)	ND (0.24)
gamma-Chlordane	ug/kg	-	-	ND (0.44)	ND (0.51)	ND (0.47)	ND (0.48)	ND (0.46)	ND (0.52)	ND (0.44)	ND (0.51)	ND (0.47)	ND (0.44)
Dieldrin	ug/kg	5	200	ND (0.25)	ND (0.29)	ND (0.27)	ND (0.27)	ND (0.26)	ND (0.29)	ND (0.25)	ND (0.29)	ND (0.27)	ND (0.25)
4,4'-DDD	ug/kg	3.3	13000	ND (0.34)	ND (0.40)	ND (0.37)	ND (0.38)	ND (0.37)	ND (0.41)	ND (0.35)	ND (0.40)	ND (0.37)	ND (0.35)
4,4'-DDE	ug/kg	3.3	8900	ND (0.25)	ND (0.30)	ND (0.27)	ND (0.28)	ND (0.27)	ND (0.30)	ND (0.25)	ND (0.30)	ND (0.28)	ND (0.26)
4,4'-DDT	ug/kg	3.3	7900	ND (0.31)	ND (0.36)	ND (0.34)	ND (0.34)	ND (0.33)	ND (0.37)	ND (0.31)	ND (0.37)	ND (0.34)	ND (0.31)
Endrin	ug/kg	14	11000	ND (0.20)	ND (0.24)	ND (0.22)	ND (0.23)	ND (0.22)	ND (0.24)	ND (0.20)	ND (0.24)	ND (0.22)	ND (0.21)
Endosulfan sulfate	ug/kg	2400	24000	ND (0.27)	ND (0.31)	ND (0.29)	ND (0.30)	ND (0.29)	ND (0.32)	ND (0.27)	ND (0.32)	ND (0.29)	ND (0.27)
Endrin aldehyde	ug/kg	-	-	ND (0.33)	ND (0.38)	ND (0.36)	ND (0.36)	ND (0.35)	ND (0.39)	ND (0.33)	ND (0.39)	ND (0.36)	ND (0.33)
Endosulfan-I	ug/kg	2400	24000	ND (0.24)	ND (0.28)	ND (0.26)	ND (0.26)	ND (0.26)	ND (0.28)	ND (0.24)	ND (0.28)	ND (0.26)	ND (0.24)
Endosulfan-II	ug/kg	2400	24000	ND (0.38)	ND (0.44)	ND (0.41)	ND (0.42)	ND (0.40)	ND (0.45)	ND (0.38)	ND (0.44)	ND (0.41)	ND (0.38)
Heptachlor	ug/kg	42	2100	ND (0.31)	ND (0.36)	ND (0.33)	ND (0.34)	ND (0.33)	ND (0.36)	ND (0.31)	ND (0.36)	ND (0.33)	ND (0.31)
Heptachlor epoxide	ug/kg	-	-	ND (0.24)	ND (0.27)	ND (0.25)	ND (0.26)	ND (0.25)	ND (0.28)	ND (0.24)	ND (0.28)	ND (0.26)	ND (0.24)
Methoxychlor	ug/kg	-	-	ND (0.62)	ND (0.72)	ND (0.67)	ND (0.68)	ND (0.66)	ND (0.73)	ND (0.62)	ND (0.73)	ND (0.67)	ND (0.62)
Endrin ketone	ug/kg	-	-	ND (0.26)	ND (0.30)	ND (0.28)	ND (0.28)	ND (0.27)	ND (0.30)	ND (0.26)	ND (0.30)	ND (0.28)	ND (0.26)
Toxaphene	ug/kg	-	-	ND (7.9)	ND (9.2)	ND (8.6)	ND (8.8)	ND (8.5)	ND (9.4)	ND (8.0)	ND (9.3)	ND (8.6)	ND (8.0)
<b>GC Semi-volatiles (SW846 8082A)</b>													
Aroclor 1016	ug/kg	100	1000	ND (8.2)	ND (9.5)	ND (8.9)	ND (9.1)	ND (8.8)	ND (9.7)	ND (8.2)	ND (9.6)	ND (8.9)	ND (8.3)
Aroclor 1221	ug/kg	100	1000	ND (19)	ND (22)	ND (21)	ND (21)	ND (20)	ND (22)	ND (19)	ND (22)	ND (21)	ND (19)
Aroclor 1232	ug/kg	100	1000	ND (16)	ND (19)	ND (17)	ND (18)	ND (17)	ND (19)	ND (16)	ND (19)	ND (17)	ND (16)
Aroclor 1242	ug/kg	100	1000	ND (10)	ND (12)	ND (11)	ND (11)	ND (11)	ND (12)	ND (10)	ND (12)	ND (11)	ND (10)
Aroclor 1248	ug/kg	100	1000	ND (9.6)	ND (11)	ND (10)	ND (11)	ND (10)	ND (11)	ND (9.6)	ND (11)	ND (10)	ND (9.7)
Aroclor 1254	ug/kg	100	1000	ND (15)	ND (17)	ND (16)	ND (16)	ND (16)	ND (17)	ND (15)	ND (17)	ND (16)	ND (15)
Aroclor 1260	ug/kg	100	1000	ND (10)	ND (12)	ND (11)	ND (11)	ND (11)	ND (12)	ND (10)	ND (12)	ND (11)	ND (10)
Aroclor 1268	ug/kg	100	1000	ND (9.3)	ND (11)	ND (10)	ND (10)	ND (9.9)	ND (11)	ND (9.3)	ND (11)	ND (10)	ND (9.3)
Aroclor 1262	ug/kg	100	1000	ND (10)	ND (12)	ND (11)	ND (11)	ND (11)	ND (12)	ND (10)	ND (12)	ND (11)	ND (10)

Legend:	Hit	Exceeds UUSCO	Exceeds RRSCO
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Table 4 - Metals in Soil  
33-01 38th Avenue, Queens, NY

Client Sample ID:		NY SCO - Unrestricted Use (6 NYCRR 375-6 12/06)	NY SCO - Restricted Residential Use (6 NYCRR 375-6 12/06)	SB-1(12-14)	SB-1(6-8)	SB-2(12-14)	SB-2(6-8)	SB-3(12-14)	SB-3(6-8)	SB-4(2-4)	SB-4(12-14)	SB-5(0-2)	SB-5(4-6)
Lab Sample ID:				JB84101-2	JB84101-1	JB84101-4	JB84101-3	JB84101-6	JB84101-5	JB84101-7	JB84101-8	JB84101-9	JB84101-10
Date Sampled:				12/11/2014	12/11/2014	12/11/2014	12/11/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014
Matrix:				Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
<b>Metals Analysis</b>													
Aluminum	mg/kg	-	-	4070	13200	7170	6830	4430	5200	9540	6080	7390	4210
Antimony	mg/kg	-	-	<2.1	<2.0	<2.2	<2.1	<2.1	<2.2	<2.2	<2.2	<2.2	<2.1
Arsenic	mg/kg	13	16	<2.1	2.1	2.4	<2.1	<2.1	<2.2	4	<2.2	<2.2	<2.1
Barium	mg/kg	350	400	22.8	65.4	44.5	47.9	27.2	32.6	51.9	34.8	49	56.7
Beryllium	mg/kg	7.2	72	<0.21	0.49	0.55	0.32	0.25	0.33	0.33	0.28	0.29	0.21
Cadmium	mg/kg	2.5	4.3	<0.53	<0.51	<0.55	<0.53	<0.52	<0.54	<0.55	<0.54	<0.54	<0.53
Calcium	mg/kg	-	-	1380	1020	1150	5990	2380	7210	3330	6250	2720	28300
Chromium	mg/kg	-	-	10.3	25.6	18.9	15	14	14.7	15.4	14.3	18.6	9.7
Cobalt	mg/kg	-	-	<5.3	8.6	6.7	46.4	6.9	12.5	<5.5	5.8	6.8	<5.3
Copper	mg/kg	50	270	7.4	16.6	13.6	15.6	11.9	12.7	31.1	16.7	14.4	6.5
Iron	mg/kg	-	-	8450	18300	13600	12700	10100	10900	14300	13000	13900	8200
Lead	mg/kg	63	400	2.7	6.4	5	14.6	3.1	17.4	86.4	14.9	3.9	2.3
Magnesium	mg/kg	-	-	2770	5100	3610	3850	3280	6120	3150	4960	5470	16000
Manganese	mg/kg	1600	2000	197	384	334	330	225	275	250	285	251	423
Mercury	mg/kg	0.18	0.81	<0.035	<0.036	<0.033	<0.033	<0.031	<0.037	0.08	<0.033	<0.036	<0.035
Nickel	mg/kg	30	310	8.4	16.8	16.1	19.3	10.5	15.6	11	13.4	15.4	9.3
Potassium	mg/kg	-	-	<1100	1490	1250	1280	<1000	<1100	<1100	1240	1750	<1100
Selenium	mg/kg	3.9	180	<2.1	<2.0	<2.2	<2.1	<2.1	<2.2	<2.2	<2.2	<2.2	<2.1
Silver	mg/kg	2	180	<0.53	0.6	<0.55	<0.53	<0.52	<0.54	0.57	<0.54	<0.54	<0.53
Sodium	mg/kg	-	-	<1100	<1000	<1100	<1100	<1000	<1100	<1100	<1100	<1100	<1100
Thallium	mg/kg	-	-	<1.1	<1.0	<1.1	<1.1	<1.0	<1.1	<1.1	<1.1	<1.1	<1.1
Vanadium	mg/kg	-	-	12.3	33.1	21.9	19	15.5	16.5	21.3	20.6	23.7	11.8
Zinc	mg/kg	109	10000	22.8	49.2	37.5	64.7	30.1	101	55.6	39.8	46.2	26.2

<b>Legend:</b>	Hit	Exceeds UUSCO	Exceed RRSCO
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Table 5 - Volatile Organic Compounds in Groundwater  
33-01 38th Avenue, Queens, NY

Client Sample ID:		NY TOGS Class GA GW Standards (NYSDEC 6/2004) <sup>1</sup>	FB121214	GW-1	GW-2	GW-3	TRIP BLANK
Lab Sample ID:			JB84101-14	JB84101-11	JB84101-12	JB84101-13	JB84101-15
Date Sampled:			12/12/2014	12/11/2014	12/12/2014	12/12/2014	12/12/2014
Matrix:			Field Blank	Ground Water	Ground Water	Ground Water	Trip Blank
GC/MS Volatiles (SW846 8260C)							
Acetone	ug/l	-	ND (2.7)	ND (2.7)	ND (2.7)	ND (2.7)	ND (2.7)
Benzene	ug/l	1	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)
Bromochloromethane	ug/l	5	ND (0.49)	ND (0.49)	ND (0.49)	ND (0.49)	ND (0.49)
Bromodichloromethane	ug/l	-	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
Bromoform	ug/l	-	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)
Bromomethane	ug/l	5	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)
2-Butanone (MEK)	ug/l	-	ND (2.3)	ND (2.3)	ND (2.3)	ND (2.3)	ND (2.3)
Carbon disulfide	ug/l	60	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)
Carbon tetrachloride	ug/l	5	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
Chlorobenzene	ug/l	5	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
Chloroethane	ug/l	5	ND (0.65)	ND (0.65)	ND (0.65)	ND (0.65)	ND (0.65)
Chloroform	ug/l	7	ND (0.20)	0.47 J	ND (0.20)	2.1	ND (0.20)
Chloromethane	ug/l	5	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)
Cyclohexane	ug/l	-	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)	ND (0.23)
1,2-Dibromo-3-chloropropane	ug/l	0.04	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)
Dibromochloromethane	ug/l	-	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
1,2-Dibromoethane	ug/l	0.0006	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)
1,2-Dichlorobenzene	ug/l	3	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)
1,3-Dichlorobenzene	ug/l	3	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
1,4-Dichlorobenzene	ug/l	3	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)
Dichlorodifluoromethane	ug/l	5	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)
1,1-Dichloroethane	ug/l	5	ND (0.35)	0.81 J	ND (0.35)	ND (0.35)	ND (0.35)
1,2-Dichloroethane	ug/l	0.6	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)	ND (0.30)
1,1-Dichloroethene	ug/l	5	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
cis-1,2-Dichloroethene	ug/l	5	ND (0.33)	0.84 J	ND (0.33)	ND (0.33)	ND (0.33)
trans-1,2-Dichloroethene	ug/l	5	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)	ND (0.51)
1,2-Dichloropropane	ug/l	1	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)	ND (0.34)
cis-1,3-Dichloropropene	ug/l	-	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)	ND (0.18)
trans-1,3-Dichloropropene	ug/l	-	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)
Ethylbenzene	ug/l	5	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)
Freon 113	ug/l	5	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
2-Hexanone	ug/l	-	ND (2.3)	ND (2.3)	ND (2.3)	ND (2.3)	ND (2.3)
Isopropylbenzene	ug/l	5	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
Methyl Acetate	ug/l	-	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)
Methylcyclohexane	ug/l	-	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
Methyl Tert Butyl Ether	ug/l	10	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
4-Methyl-2-pentanone(MIBK)	ug/l	-	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)	ND (1.2)
Methylene chloride	ug/l	5	ND (0.89)	ND (0.89)	ND (0.89)	ND (0.89)	ND (0.89)
Styrene	ug/l	5	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
1,1,2,2-Tetrachloroethane	ug/l	5	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)	ND (0.39)
Tetrachloroethene	ug/l	5	ND (0.35)	21.9	5.8	8.2	ND (0.35)
Toluene	ug/l	5	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
1,2,3-Trichlorobenzene	ug/l	5	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)
1,2,4-Trichlorobenzene	ug/l	5	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
1,1,1-Trichloroethane	ug/l	5	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)
1,1,2-Trichloroethane	ug/l	1	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)
Trichloroethene	ug/l	5	ND (0.25)	8	2.1	5.3	ND (0.25)
Trichlorofluoromethane	ug/l	5	ND (0.47)	ND (0.47)	ND (0.47)	ND (0.47)	ND (0.47)
Vinyl chloride	ug/l	2	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)
m,p-Xylene	ug/l	-	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)	ND (0.35)
o-Xylene	ug/l	5	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
Xylene (total)	ug/l	5	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)

Legend:	Hit	Exceed
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Table 6 - Semi-Volatile Organic Compounds in Groundwater  
33-01 38th Avenue, Queens, NY

Client Sample ID:		NY TOGS Class GA GW Standards (NYSDEC 6/2004)1	FB121214	GW-1	GW-2	GW-3
Lab Sample ID:			JB84101-14	JB84101-11	JB84101-12	JB84101-13
Date Sampled:			12/12/2014	12/11/2014	12/12/2014	12/12/2014
Matrix:			Field Blank	Ground Water	Ground Water	Ground Water
GC/MS Semi-volatiles (SW846 8270D)						
2-Chlorophenol	ug/l	-	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)
4-Chloro-3-methyl phenol	ug/l	-	ND (1.4)	ND (1.3)	ND (1.3)	ND (1.3)
2,4-Dichlorophenol	ug/l	1	ND (1.7)	ND (1.6)	ND (1.6)	ND (1.6)
2,4-Dimethylphenol	ug/l	1	ND (1.9)	ND (1.8)	ND (1.8)	ND (1.8)
2,4-Dinitrophenol	ug/l	1	ND (6.8)	ND (6.5)	ND (6.5)	ND (6.5)
4,6-Dinitro-o-cresol	ug/l	-	ND (1.4)	ND (1.3)	ND (1.3)	ND (1.3)
2-Methylphenol	ug/l	-	ND (1.3)	ND (1.3)	ND (1.3)	ND (1.3)
3&4-Methylphenol	ug/l	-	ND (1.1)	ND (1.1)	ND (1.1)	ND (1.1)
2-Nitrophenol	ug/l	-	ND (1.9)	ND (1.9)	ND (1.9)	ND (1.9)
4-Nitrophenol	ug/l	-	ND (0.94)	ND (0.91)	ND (0.91)	ND (0.91)
Pentachlorophenol	ug/l	1	ND (1.4)	ND (1.4)	ND (1.4)	ND (1.4)
Phenol	ug/l	1	ND (0.57)	ND (0.55)	ND (0.55)	ND (0.55)
2,3,4,6-Tetrachlorophenol	ug/l	-	ND (1.5)	ND (1.4)	ND (1.4)	ND (1.4)
2,4,5-Trichlorophenol	ug/l	-	ND (1.8)	ND (1.7)	ND (1.7)	ND (1.7)
2,4,6-Trichlorophenol	ug/l	-	ND (1.6)	ND (1.5)	ND (1.5)	ND (1.5)
Acenaphthene	ug/l	-	ND (0.31)	ND (0.30)	ND (0.30)	ND (0.30)
Acenaphthylene	ug/l	-	ND (0.21)	ND (0.20)	ND (0.20)	ND (0.20)
Acetophenone	ug/l	-	ND (0.38)	ND (0.36)	ND (0.36)	ND (0.36)
Anthracene	ug/l	-	ND (0.20)	ND (0.19)	ND (0.19)	ND (0.19)
Atrazine	ug/l	7.5	ND (0.44)	ND (0.42)	ND (0.42)	ND (0.42)
Benzaldehyde	ug/l	-	ND (0.70)	ND (0.67)	ND (0.67)	ND (0.67)
Benzo(a)anthracene	ug/l	-	ND (0.23)	ND (0.22)	ND (0.22)	ND (0.22)
Benzo(a)pyrene	ug/l	ND	ND (0.25)	ND (0.24)	ND (0.24)	ND (0.24)
Benzo(b)fluoranthene	ug/l	-	ND (0.23)	ND (0.22)	ND (0.22)	ND (0.22)
Benzo(g,h,i)perylene	ug/l	-	ND (0.32)	ND (0.31)	ND (0.31)	ND (0.31)
Benzo(k)fluoranthene	ug/l	-	ND (0.23)	ND (0.22)	ND (0.22)	ND (0.22)
4-Bromophenyl phenyl ether	ug/l	-	ND (0.26)	ND (0.25)	ND (0.25)	ND (0.25)
Butyl benzyl phthalate	ug/l	-	ND (0.23)	ND (0.22)	ND (0.22)	ND (0.22)
1,1'-Biphenyl	ug/l	5	ND (0.29)	ND (0.27)	ND (0.27)	ND (0.27)
2-Chloronaphthalene	ug/l	-	ND (0.36)	ND (0.34)	ND (0.34)	ND (0.34)
4-Chloroaniline	ug/l	5	ND (0.31)	ND (0.30)	ND (0.30)	ND (0.30)
Carbazole	ug/l	-	ND (0.18)	ND (0.17)	ND (0.17)	ND (0.17)
Caprolactam	ug/l	-	ND (0.42)	ND (0.41)	ND (0.41)	ND (0.41)
Chrysene	ug/l	-	ND (0.17)	ND (0.16)	ND (0.16)	ND (0.16)
bis(2-Chloroethoxy)methane	ug/l	5	ND (0.44)	ND (0.42)	ND (0.42)	ND (0.42)
bis(2-Chloroethyl)ether	ug/l	1	ND (0.45)	ND (0.43)	ND (0.43)	ND (0.43)
bis(2-Chloroisopropyl)ether	ug/l	5	ND (0.42)	ND (0.41)	ND (0.41)	ND (0.41)
4-Chlorophenyl phenyl ether	ug/l	-	ND (0.40)	ND (0.38)	ND (0.38)	ND (0.38)
2,4-Dinitrotoluene	ug/l	5	ND (0.33)	ND (0.32)	ND (0.32)	ND (0.32)
2,6-Dinitrotoluene	ug/l	5	ND (0.27)	ND (0.26)	ND (0.26)	ND (0.26)
3,3'-Dichlorobenzidine	ug/l	5	ND (0.58)	ND (0.56)	ND (0.56)	ND (0.56)
1,4-Dioxane	ug/l	-	ND (0.74)	ND (0.72)	ND (0.72)	ND (0.72)
Dibenzo(a,h)anthracene	ug/l	-	ND (0.29)	ND (0.28)	ND (0.28)	ND (0.28)
Dibenzofuran	ug/l	-	ND (0.24)	ND (0.23)	ND (0.23)	ND (0.23)
Di-n-butyl phthalate	ug/l	50	ND (0.61)	ND (0.58)	ND (0.58)	ND (0.58)
Di-n-octyl phthalate	ug/l	-	ND (0.26)	ND (0.25)	ND (0.25)	ND (0.25)
Diethyl phthalate	ug/l	-	ND (0.24)	ND (0.23)	1.1 J	ND (0.23)
Dimethyl phthalate	ug/l	-	ND (0.27)	ND (0.26)	ND (0.26)	ND (0.26)
bis(2-Ethylhexyl)phthalate	ug/l	5	3.0 B	3.8 B	ND (0.55)	3.5 B
Fluoranthene	ug/l	-	ND (0.17)	ND (0.16)	ND (0.16)	ND (0.16)
Fluorene	ug/l	-	ND (0.28)	ND (0.27)	ND (0.27)	ND (0.27)
Hexachlorobenzene	ug/l	0.04	ND (0.48)	ND (0.46)	ND (0.46)	ND (0.46)
Hexachlorobutadiene	ug/l	0.5	ND (0.40)	ND (0.39)	ND (0.39)	ND (0.39)
Hexachlorocyclopentadiene	ug/l	5	ND (0.50)	ND (0.48)	ND (0.48)	ND (0.48)
Hexachloroethane	ug/l	5	ND (0.30)	ND (0.29)	ND (0.29)	ND (0.29)
Indeno(1,2,3-cd)pyrene	ug/l	-	ND (0.42)	ND (0.40)	ND (0.40)	ND (0.40)
Isophorone	ug/l	-	ND (0.35)	ND (0.34)	ND (0.34)	ND (0.34)
2-Methylnaphthalene	ug/l	-	ND (0.30)	ND (0.29)	ND (0.29)	ND (0.29)
2-Nitroaniline	ug/l	5	ND (0.33)	ND (0.32)	ND (0.32)	ND (0.32)
3-Nitroaniline	ug/l	5	ND (0.27)	ND (0.26)	ND (0.26)	ND (0.26)
4-Nitroaniline	ug/l	5	ND (0.31)	ND (0.30)	ND (0.30)	ND (0.30)
Naphthalene	ug/l	-	ND (0.28)	ND (0.27)	ND (0.27)	ND (0.27)
Nitrobenzene	ug/l	0.4	ND (0.54)	ND (0.52)	ND (0.52)	ND (0.52)
N-Nitroso-di-n-propylamine	ug/l	-	ND (0.39)	ND (0.38)	ND (0.38)	ND (0.38)
N-Nitrosodiphenylamine	ug/l	-	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)
Phenanthrene	ug/l	-	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
Pyrene	ug/l	-	ND (0.20)	ND (0.19)	ND (0.19)	ND (0.19)
1,2,4,5-Tetrachlorobenzene	ug/l	5	ND (0.46)	ND (0.44)	ND (0.44)	ND (0.44)

Legend: Hit Exceed

Table 7 - Pesticides and PCBs in Groundwater  
33-01 38th Avenue, Queens, NY

Client Sample ID:		NY TOGS Class GA GW Standards (NYSDEC 6/2004)1	FB121214	GW-1	GW-2	GW-3
Lab Sample ID:			JB84101-14	JB84101-11	JB84101-12	JB84101-13
Date Sampled:			12/12/2014	12/11/2014	12/12/2014	12/12/2014
Matrix:			Field Blank	Ground Water	Ground Water	Ground Water
GC Semi-volatiles (SW846 8081B)						
Aldrin	ug/l	ND	ND (0.0080)	ND (0.0079)	ND (0.0079)	ND (0.0079)
alpha-BHC	ug/l	0.01	ND (0.0024)	ND (0.0023)	ND (0.0023)	ND (0.0023)
beta-BHC	ug/l	0.04	ND (0.0023)	ND (0.0023)	ND (0.0023)	ND (0.0023)
delta-BHC	ug/l	0.04	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)
gamma-BHC (Lindane)	ug/l	0.05	ND (0.0018)	ND (0.0017)	ND (0.0017)	ND (0.0017)
alpha-Chlordane	ug/l	-	ND (0.0029)	ND (0.0029)	ND (0.0029)	ND (0.0029)
gamma-Chlordane	ug/l	-	ND (0.0022)	ND (0.0021)	ND (0.0021)	ND (0.0021)
Dieldrin	ug/l	0.004	ND (0.0016)	ND (0.0016)	ND (0.0016)	ND (0.0016)
4,4'-DDD	ug/l	0.3	ND (0.0025)	ND (0.0025)	ND (0.0025)	ND (0.0025)
4,4'-DDE	ug/l	0.2	ND (0.0017)	ND (0.0017)	ND (0.0017)	ND (0.0017)
4,4'-DDT	ug/l	0.2	ND (0.0032)	ND (0.0032)	ND (0.0032)	ND (0.0032)
Endrin	ug/l	ND	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)
Endosulfan sulfate	ug/l	-	ND (0.0019)	ND (0.0019)	ND (0.0019)	ND (0.0019)
Endrin aldehyde	ug/l	5	ND (0.0037)	ND (0.0037)	ND (0.0037)	ND (0.0037)
Endrin ketone	ug/l	5	ND (0.0048)	ND (0.0047)	ND (0.0047)	ND (0.0047)
Endosulfan-I	ug/l	-	ND (0.0029)	ND (0.0028)	ND (0.0028)	ND (0.0028)
Endosulfan-II	ug/l	-	ND (0.0020)	ND (0.0020)	ND (0.0020)	ND (0.0020)
Heptachlor	ug/l	0.04	ND (0.0022)	ND (0.0022)	ND (0.0022)	ND (0.0022)
Heptachlor epoxide	ug/l	0.03	ND (0.0027)	ND (0.0026)	ND (0.0026)	ND (0.0026)
Methoxychlor	ug/l	35	ND (0.0041)	ND (0.0041)	ND (0.0041)	ND (0.0041)
Toxaphene	ug/l	0.06	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
(SW846 8082A)						
Aroclor 1016	ug/l	0.09	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)
Aroclor 1221	ug/l	0.09	ND (0.29)	ND (0.27)	ND (0.27)	ND (0.27)
Aroclor 1232	ug/l	0.09	ND (0.41)	ND (0.39)	ND (0.39)	ND (0.39)
Aroclor 1242	ug/l	0.09	ND (0.091)	ND (0.086)	ND (0.086)	ND (0.086)
Aroclor 1248	ug/l	0.09	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
Aroclor 1254	ug/l	0.09	ND (0.15)	ND (0.14)	ND (0.14)	ND (0.14)
Aroclor 1260	ug/l	0.09	ND (0.22)	ND (0.21)	ND (0.21)	ND (0.21)
Aroclor 1268	ug/l	0.09	ND (0.14)	ND (0.13)	ND (0.13)	ND (0.13)
Aroclor 1262	ug/l	0.09	ND (0.063)	ND (0.060)	ND (0.060)	ND (0.060)

Legend:	Hit	Exceed
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Table 8 - Metals in Groundwater  
33-01 38th Avenue, Queens, NY

Client Sample ID:		NY TOGS Class GA GW Standards (NYSDEC 6/2004) <sup>1</sup>	FB121214	FB121214	GW-1	GW-1	GW-2	GW-2	GW-3	GW-3
Lab Sample ID:			JB84101-14	JB84101-14F	JB84101-11	JB84101-11F	JB84101-12	JB84101-12F	JB84101-13	JB84101-13F
Date Sampled:			12/12/2014	12/12/2014	12/11/2014	12/11/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014
Matrix:			Field Blank Water	Field Blank Filtered	Ground Water	Groundwater Filtered	Ground Water	Groundwater Filtered	Ground Water	Groundwater Filtered
Metals Analysis										
Aluminum	ug/l	-	<200	<200	3800	<200	<200	<200	<200	<200
Antimony	ug/l	3	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0	<6.0
Arsenic	ug/l	25	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Barium	ug/l	1000	<200	<200	205	<200	<200	<200	<200	<200
Beryllium	ug/l	-	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Cadmium	ug/l	5	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0	<3.0
Calcium	ug/l	-	<5000	<5000	92900	92700	114000	89700	82600	84700
Chromium	ug/l	50	<10	<10	15.2	<10	<10	<10	<10	<10
Cobalt	ug/l	-	<50	<50	<50	<50	<50	<50	<50	<50
Copper	ug/l	200	<10	<10	37.6	<10	<10	<10	<10	<10
Iron	ug/l	300	<100	<100	9550	<100	586	<100	360	<100
Lead	ug/l	25	<3.0	<3.0	3.4	<3.0	<3.0	<3.0	<3.0	<3.0
Magnesium	ug/l	-	<5000	<5000	41200	39500	39200	30600	29800	30600
Manganese	ug/l	300	<15	<15	2000	244	431	347	184	176
Mercury	ug/l	0.7	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Nickel	ug/l	100	<10	<10	32.2	<10	<10	<10	<10	<10
Potassium	ug/l	-	<10000	<10000	<10000	<10000	<10000	<10000	<10000	<10000
Selenium	ug/l	10	<10	<10	<10	<10	<10	<10	<10	<10
Silver	ug/l	50	<10	<10	<10	<10	<10	<10	<10	<10
Sodium	ug/l	20000	<10000	<10000	101000	106000	194000	158000	101000	105000
Thallium	ug/l	-	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Vanadium	ug/l	-	<50	<50	<50	<50	<50	<50	<50	<50
Zinc	ug/l	-	<20	<20	35.6	<20	<20	<20	<20	<20

<b>Legend:</b>	Hit	Exceed
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Table 9 - Volatile Organic Compounds in Soil Vapor  
33-01 38th Avenue, Queens, NY

Client Sample ID:		NYSDOH Final Guidance for Evaluating Soil Vapor Intrusion (Ambient Air)	IA-1	OA-1	SS-1	SS-2	SS-3	SS-4	SV-1
Lab Sample ID:			JB84098-7	JB84098-6	JB84098-1	JB84098-2	JB84098-3	JB84098-4	JB84098-5
Date Sampled:			12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014	12/12/2014
Matrix:			Indoor Air Comp.	Ambient Air Comp.	Soil Vapor Comp.	Soil Vapor Comp.	Soil Vapor Comp.	Soil Vapor Comp.	Soil Vapor Comp.
GC/MS Volatiles (TO-15) - ug/m3									
Acetone	ug/m3		17	9	135	89.6	21	81.7	221
1,3-Butadiene	ug/m3	-	1.1	ND (0.075)	ND (0.075)	ND (0.075)	0.62	0.73	ND (0.075)
Benzene	ug/m3	-	3.2	0.77	ND (0.080)	0.48 J	1.9	2.6	7
Bromodichloromethane	ug/m3	-	ND (0.19)	ND (0.19)	1.4	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
Bromoform	ug/m3	-	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)	ND (0.36)
Bromomethane	ug/m3	-	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)
Bromoethene	ug/m3	-	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
Benzyl Chloride	ug/m3	-	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)	ND (0.24)
Carbon disulfide	ug/m3	-	ND (0.097)	ND (0.097)	ND (0.097)	0.56 J	0.56 J	1.1	2.2
Chlorobenzene	ug/m3	-	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)
Chloroethane	ug/m3	-	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
Chloroform	ug/m3	-	ND (0.12)	ND (0.12)	12	38	0.88 J	ND (0.12)	5.9
Chloromethane	ug/m3	-	1.2	1.2	ND (0.16)	ND (0.16)	0.47	1.4	ND (0.16)
3-Chloropropene	ug/m3	-	ND (0.12)	ND (0.12)	ND (0.12)	ND (0.12)	ND (0.12)	ND (0.12)	ND (0.12)
2-Chlorotoluene	ug/m3	-	ND (0.17)	ND (0.17)	2.8	3.1	1.1	1.2	ND (0.17)
Carbon tetrachloride	ug/m3	-	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)	0.94
Cyclohexane	ug/m3	-	ND (0.093)	ND (0.093)	ND (0.093)	ND (0.093)	ND (0.093)	ND (0.093)	ND (0.093)
1,1-Dichloroethane	ug/m3	-	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	2
1,1-Dichloroethylene	ug/m3	-	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)
1,2-Dibromoethane	ug/m3	-	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	ND (0.21)	3.4
1,2-Dichloroethane	ug/m3	-	ND (0.093)	ND (0.093)	ND (0.093)	ND (0.093)	ND (0.093)	ND (0.093)	ND (0.093)
1,2-Dichloropropane	ug/m3	-	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)
1,4-Dioxane	ug/m3	-	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)	ND (0.43)
Dichlorodifluoromethane	ug/m3	-	2.4	2.5	4.9	5.4	3.1	2.5	113
Dibromochloromethane	ug/m3	-	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)	ND (0.32)
trans-1,2-Dichloroethylene	ug/m3	-	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)	ND (0.28)
cis-1,2-Dichloroethylene	ug/m3	-	ND (0.091)	ND (0.091)	ND (0.091)	ND (0.091)	ND (0.091)	ND (0.091)	ND (0.091)
cis-1,3-Dichloropropene	ug/m3	-	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
m-Dichlorobenzene	ug/m3	-	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)
o-Dichlorobenzene	ug/m3	-	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)	ND (0.17)
p-Dichlorobenzene	ug/m3	-	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
trans-1,3-Dichloropropene	ug/m3	-	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)	ND (0.11)
Ethanol	ug/m3	-	16	7.5	8.9	16	18	29	43.1
Ethylbenzene	ug/m3	-	1.9	0.48 J	ND (0.15)	0.52 J	1.5	0.78 J	3
Ethyl Acetate	ug/m3	-	17	1.7	3.5	6.5	4.7	1.8	1.1
4-Ethyltoluene	ug/m3	-	0.93 J	ND (0.16)	0.54 J	ND (0.16)	ND (0.16)	ND (0.16)	ND (0.16)
Freon 113	ug/m3	-	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	ND (0.31)	0.74 J
Freon 114	ug/m3	-	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)	ND (0.22)
Heptane	ug/m3	-	1.2	0.57 J	0.40 J	1.3	0.94	2.5	7.4
Hexachlorobutadiene	ug/m3	-	ND (0.54)	ND (0.54)	ND (0.54)	ND (0.54)	ND (0.54)	ND (0.54)	ND (0.54)
Hexane	ug/m3	-	2.5	0.88	0.39 J	0.56 J	1.4	1.6	13
2-Hexanone	ug/m3	-	ND (0.26)	ND (0.26)	ND (0.26)	1.1	ND (0.26)	ND (0.26)	ND (0.26)
Isopropyl Alcohol	ug/m3	-	31	2.2	2.7	5.4	12	7.4	3.9
Methylene chloride	ug/m3	60	2	1.8	1.2	1.2	1.2	1.9	10
Methyl ethyl ketone	ug/m3	-	2.7	0.50 J	2.7	5.3	2.4	5.9	119
Methyl Isobutyl Ketone	ug/m3	-	0.82	0.66 J	ND (0.17)	ND (0.17)	1.1	1.3	1.5
Methyl Tert Butyl Ether	ug/m3	-	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
Methylmethacrylate	ug/m3	-	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)	ND (0.15)
Propylene	ug/m3	-	4.8	2.1	0.81 J	0.70 J	2.6	3.4	5
Styrene	ug/m3	-	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.14)	ND (0.14)	0.55 J	ND (0.14)
1,1,1-Trichloroethane	ug/m3	-	ND (0.13)	ND (0.13)	0.65	2.3	0.76	ND (0.13)	8.2
1,1,2,2-Tetrachloroethane	ug/m3	-	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)	ND (0.27)
1,1,2-Trichloroethane	ug/m3	-	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)	ND (0.19)
1,2,4-Trichlorobenzene	ug/m3	-	ND (0.45)	ND (0.45)	ND (0.45)	ND (0.45)	ND (0.45)	ND (0.45)	ND (0.45)
1,2,4-Trimethylbenzene	ug/m3	-	3.3	0.93 J	1.9	1.1	1.9	0.88 J	ND (0.14)
1,3,5-Trimethylbenzene	ug/m3	-	0.88 J	ND (0.14)	0.47 J	ND (0.14)	0.54 J	ND (0.14)	ND (0.14)
2,2,4-Trimethylpentane	ug/m3	-	1.3	ND (0.12)	ND (0.12)	ND (0.12)	0.75 J	0.79 J	3.9
Tertiary Butyl Alcohol	ug/m3	-	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)	ND (0.13)	1.7	2.5
Tetrachloroethylene	ug/m3	30	8.8	6.4	349	780	983	303	536
Tetrahydrofuran	ug/m3	-	0.8	ND (0.14)	3.8	5.3	3.5	8.3	366
Toluene	ug/m3	-	9.8	6	1.3	2.2	6.4	7.9	53.9
Trichloroethylene	ug/m3	5	ND (0.16)	ND (0.16)	ND (0.16)	11	2.1	1.3	32
Trichlorofluoromethane	ug/m3	-	1.2	1.2	1.8	3.1	2.1	1.3	1.7
Vinyl chloride	ug/m3	-	ND (0.079)	ND (0.079)	ND (0.079)	ND (0.079)	ND (0.079)	ND (0.079)	ND (0.079)
Vinyl Acetate	ug/m3	-	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)	ND (0.33)
m,p-Xylene	ug/m3	-	6.9	1.7	1.1	1.9	5.2	2.7	12
o-Xylene	ug/m3	-	2.7	0.56 J	0.43 J	0.65 J	2.1	1	2.2
Xylenes (total)	ug/m3	-	10	2.3	1.6	2.6	7.4	3.7	14

Legend: Hit Exceed

# APPENDIX A

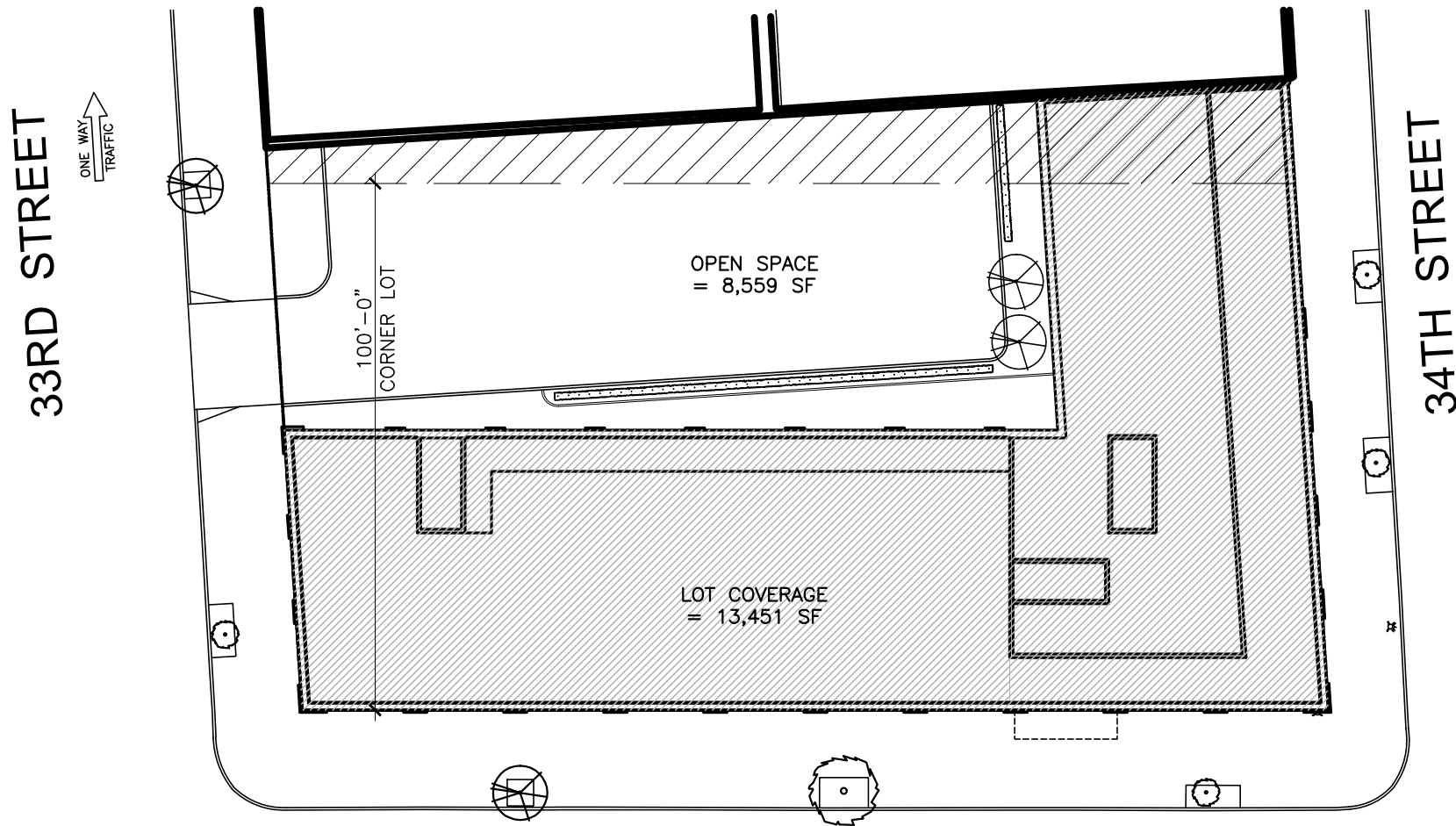
## Proposed Development Plans

ZONING ANALYSIS

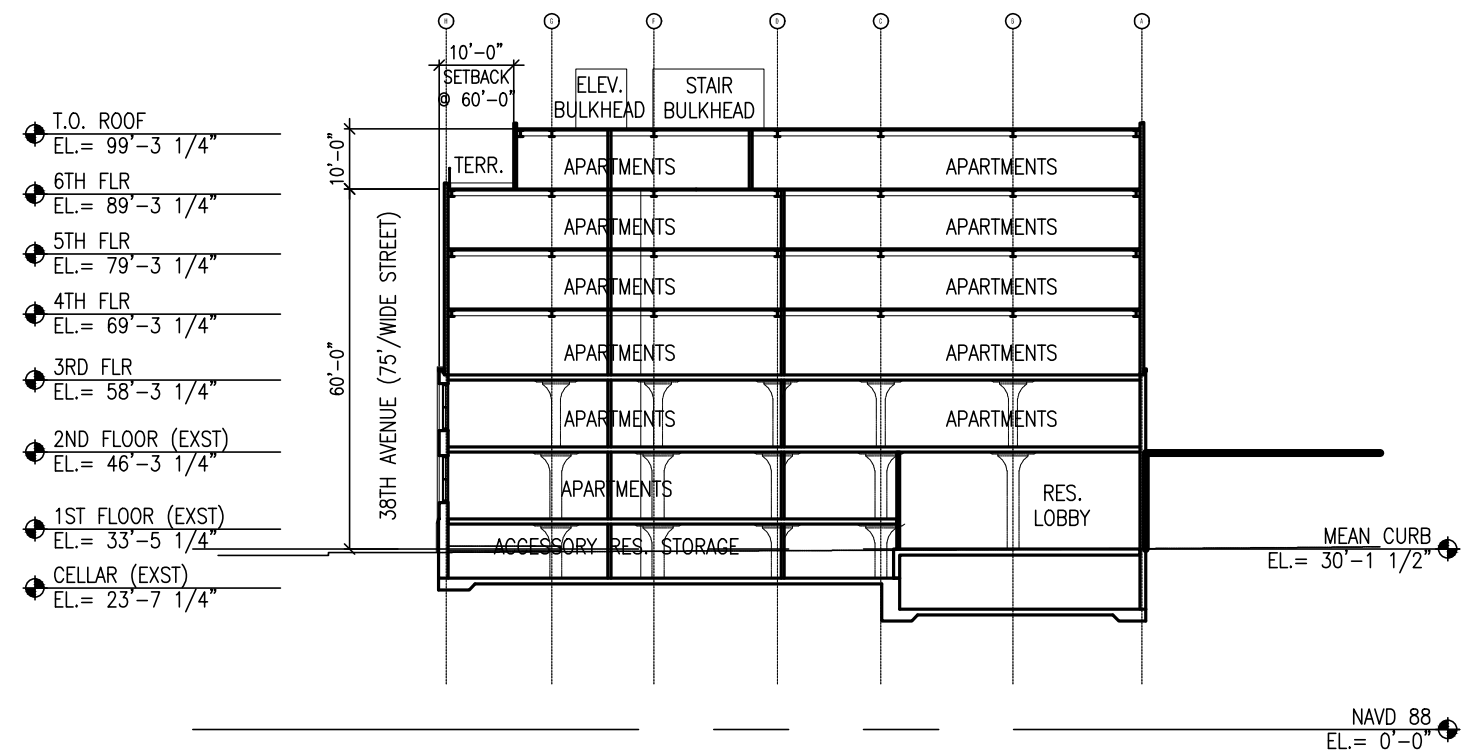
Section	33-01 38th Avenue		
	Long Island City, NY		
	Block No.375		
	Tax Lot No. 33		
	Queens 1 Community District		
Map 9b	Zoning District		
	M1-2 / R6A	Special Long Island City District	
	Tax Lot 33	Lot Area =	22,278 SF
22-10	Use Regulations		
	A. Permitted Use Groups		
	Use Groups 1-6, 8, 9, 10, 12		
	B. Proposed Use Groups		
	UG 2 Multi-family Residential		
23-011a	Quality Housing Program		
	Proposed residential building will comply with Article II, Chapter 8 for Quality Housing.		
23-03a	Street Tree Planting		
	Proposed residential building complies with street tree planting regulations. See calculations this sheet.		
23-10	Open Space and Floor Area Regulations		
23-145	Residential ( <i>Quality Housing</i> )		3.00 x 22,278 SF = 66,834 SF
	Maximum permitted ZFA		= 66,834 SF
	Proposed ZFA		= 66,368 SF
	Maximum Lot Coverage		
	Corner Lot Portion	80% x	19,557 SF = 15,646 SF
	Through Lot Portion	65% x	2,721 SF = 1,769 SF
	Total		17,414 SF
	Proposed Lot Coverage		= 13,451 SF
23-22	Maximum Number of Dwelling Units for R6		
	Dwelling Unit Factor	680 SF	
	Max Residential Floor Area	66,834	
	Maximum Number of Dwelling Units	98	
	Proposed Number of Dwelling Units	98	
23-45	Minimum Required Front Yards		
	Required Minimum Front Yard:	N/A	
23-46	Minimum Required Side Yards		
	Required Min. Side Yard: None (If provided Min. 8'-0")	No Side Yard is proposed	
23-531b	Rear Yards Excepted Through Lots - Quality Housing Buildings		
	No Rear Yard Required		
23-633(a)(1)	Height and Setback Regulations - Quality Housing Buildings		
	A. Narrow Street (33rd St, 34th St)		
	Min Base Height	40'	
	Max Base Height	60'	
	Max Building Height	70'	
	B. Wide Street and Within 100' of Wide Street (38th Ave)		
	Min Base Height	40'	
	Max Base Height	60'	
	Max Building Height	70'	
	Street Wall Regulations	N/A	
	Parking Requirements - Quality Housing Buildings R6A		
	Accessory off street parking shall be provided for at least 50% of Dwelling Units		
	Proposed 49 parking spaces to be provided with attended parking units		
25-80	Bicycle Parking		
	Required 50% of Dwelling Units		
	Proposed 49 bicycle parking spaces at Ground Floor		
28-21	Quality Housing Program - Size of Units		
	Minimum size of Dwelling Unit	=	400 SF
	Proposed Minimum Dwelling unit Size	=	401 SF
28-31	Required Recreation Space		
	Minimum Required Recreation Space	3.3% x	66,368 SF = 2,190 SF
	Recreation Space Provided: Indoor		= 1,556 SF
	Recreation Space Provided: Outdoor		= 7,224 SF

UNIT COUNT

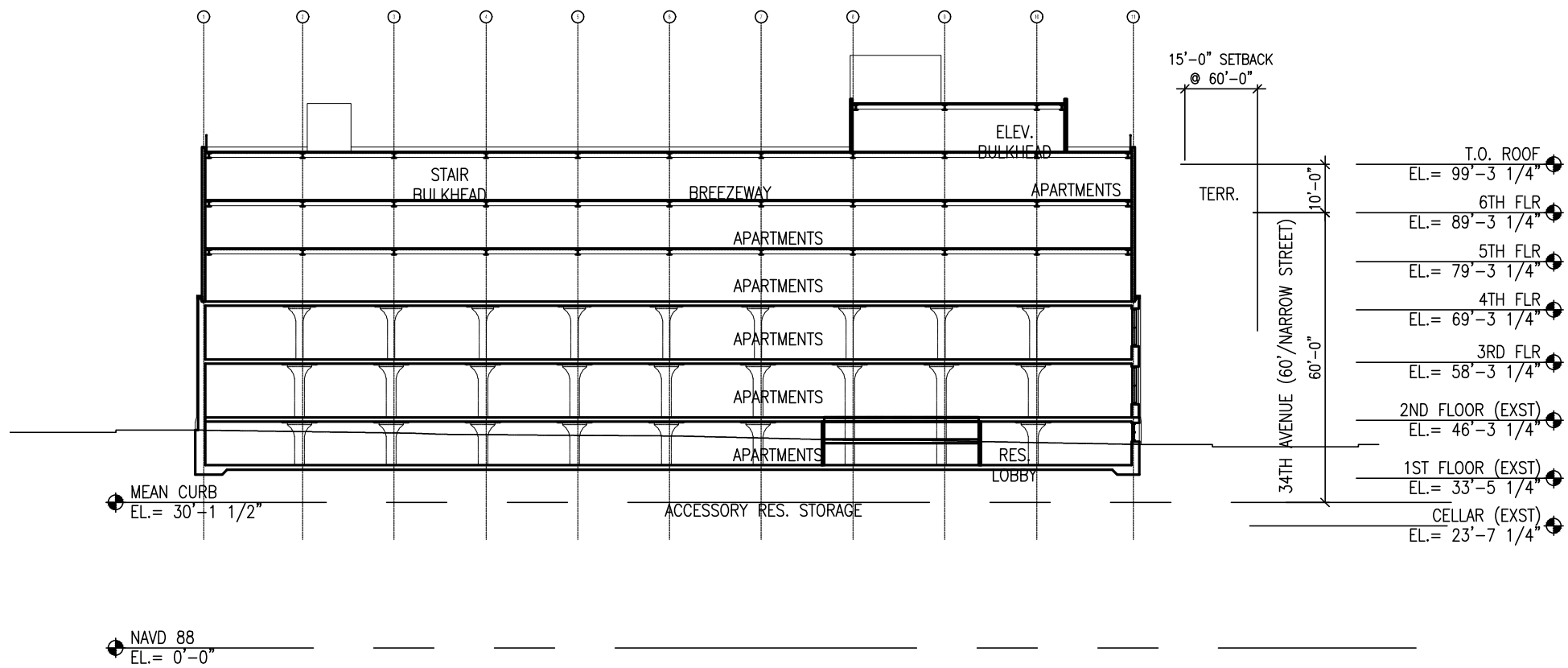
1ST FLOOR	15 APARTMENTS
2ND FLOOR	20 APARTMENTS
3RD FLOOR	20 APARTMENTS
4TH FLOOR	20 APARTMENTS
5TH FLOOR	20 APARTMENTS
6TH FLOOR	3 APARTMENTS
TOTAL	98 APARTMENTS



2 ZONING SITE DIAGRAM  
SCALE: 1/32" = 1'-0"

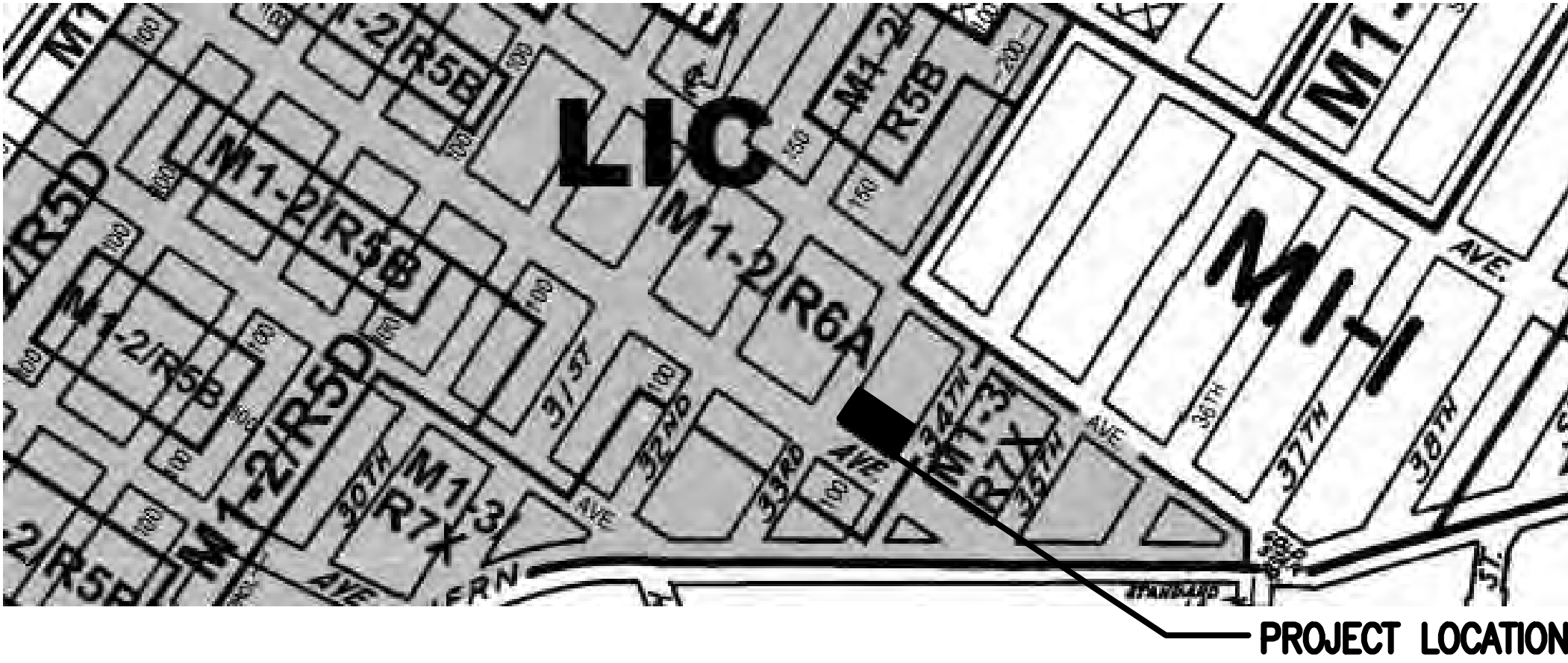


A ZONING SECTION  
SCALE: 1/32" = 1'-0"



B ZONING SECTION  
SCALE: 1/32" = 1'-0"

ZONING MAP & SITE LOCATION

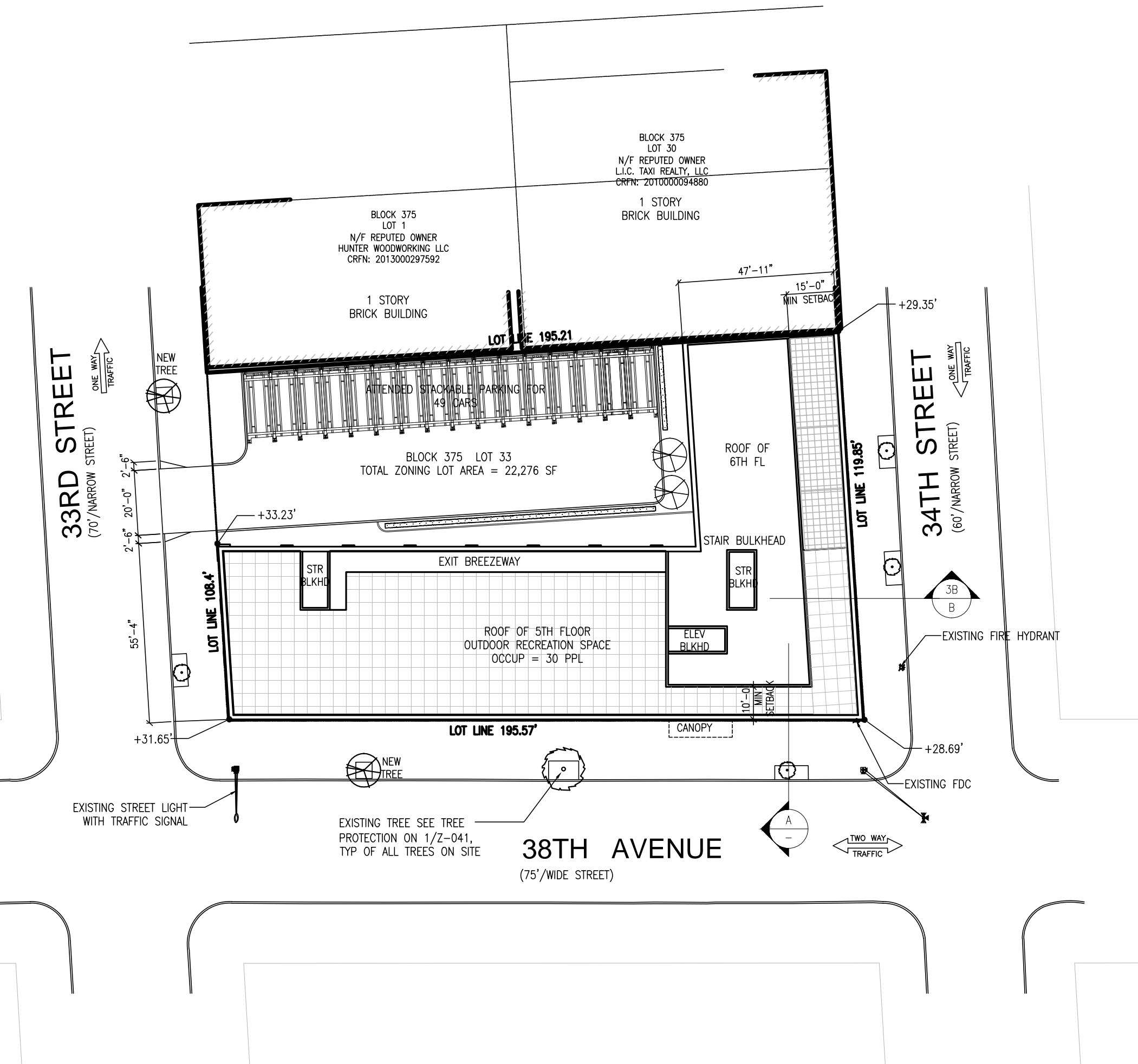


MEAN CURB HEIGHT CALCULATIONS

TOTAL BUILDING STREET FRONTAGE	=	369.32 LF		
PERCENTAGE ON 34TH STREET	=	119.85' / 369.32'	=	32.45%
PERCENTAGE ON 38TH AVENUE	=	195.57' / 369.32'	=	52.95%
PERCENTAGE ON 33RD STREET	=	53.9' / 369.32'	=	14.59%
CURB LEVEL ON 34TH STREET	=	$\frac{29.35' + 28.69'}{2}$	=	29.02 X 32.45% = 9.42'
CURB LEVEL ON 38TH AVENUE	=	$\frac{28.67' + 31.65'}{2}$	=	30.16 X 52.95% = 15.97'
CURB LEVEL ON 33RD AVENUE	=	$\frac{31.65' + 33.23'}{2}$	=	32.44 X 14.59% = 4.73'
MEAN CURB HEIGHT	=	9.42' + 15.97' + 4.73'	=	30.12'

REQUIRED STREET TREES

369.32 LF FRONTAGE / 25' = 15 TREES  
TREES PROVIDED:  
5 EXISTING + 2 NEW ON SITE + 8 NEW (LOCATION TBD) = 15



1 PLOT PLAN  
SCALE: 1/32" = 1'-0"

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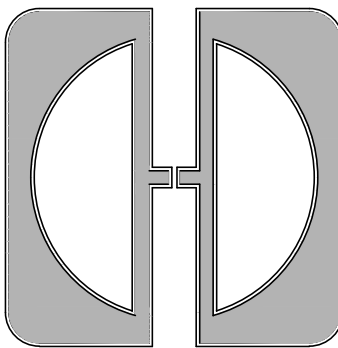
PROFESSIONAL IN CHARGE

SCOTT LOKITS  
PROJECT MANAGER  
ADELE PERERA  
QUALITY CONTROL  
WARREN DRURY  
DRAWN BY  
DEVIN MURRAY

PROJECT NAME

38TH AVE  
RESIDENTIAL  
DEVELOPMENT  
LONG ISLAND CITY  
NEW YORK CITY

33-01 38TH AVENUE  
LONG ISLAND CITY, NY 11101



THE HAKIMIAN  
ORGANIZATION

PROJECT NUMBER  
20140590.0

SHEET TITLE

SITE PLAN &  
ZONING ANALYSIS  
NYS ENERGY CODE

SHEET NUMBER 5 OF 43

2001.00

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DATE	DESCRIPTION
09/22/14	DOB SUBMITTAL

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PROFESSIONAL IN CHARGE

SCOTT LOIKITS

PROJECT MANAGER

ADELE PERERA

QUALITY CONTROL

WARREN DRURY

DRAWN BY

DEVIN MURRAY

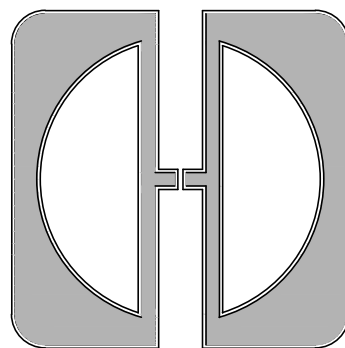
PROJECT NAME

38TH AVE  
RESIDENTIAL  
DEVELOPMENT

LONG ISLAND CITY  
NEW YORK CITY

33-01 38TH AVENUE

LONG ISLAND CITY, NY 11101



THE HAKIMIAN  
ORGANIZATION

PROJECT NUMBER

20140590.0

SHEET TITLE

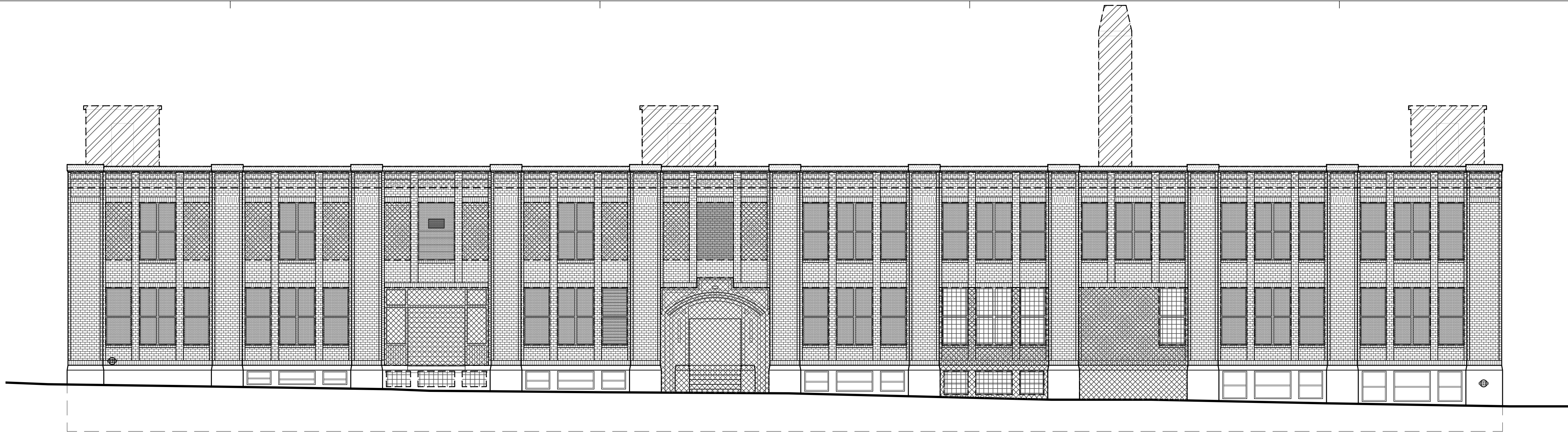
DEMOLITION  
ELEVATIONS

SHEET NUMBER

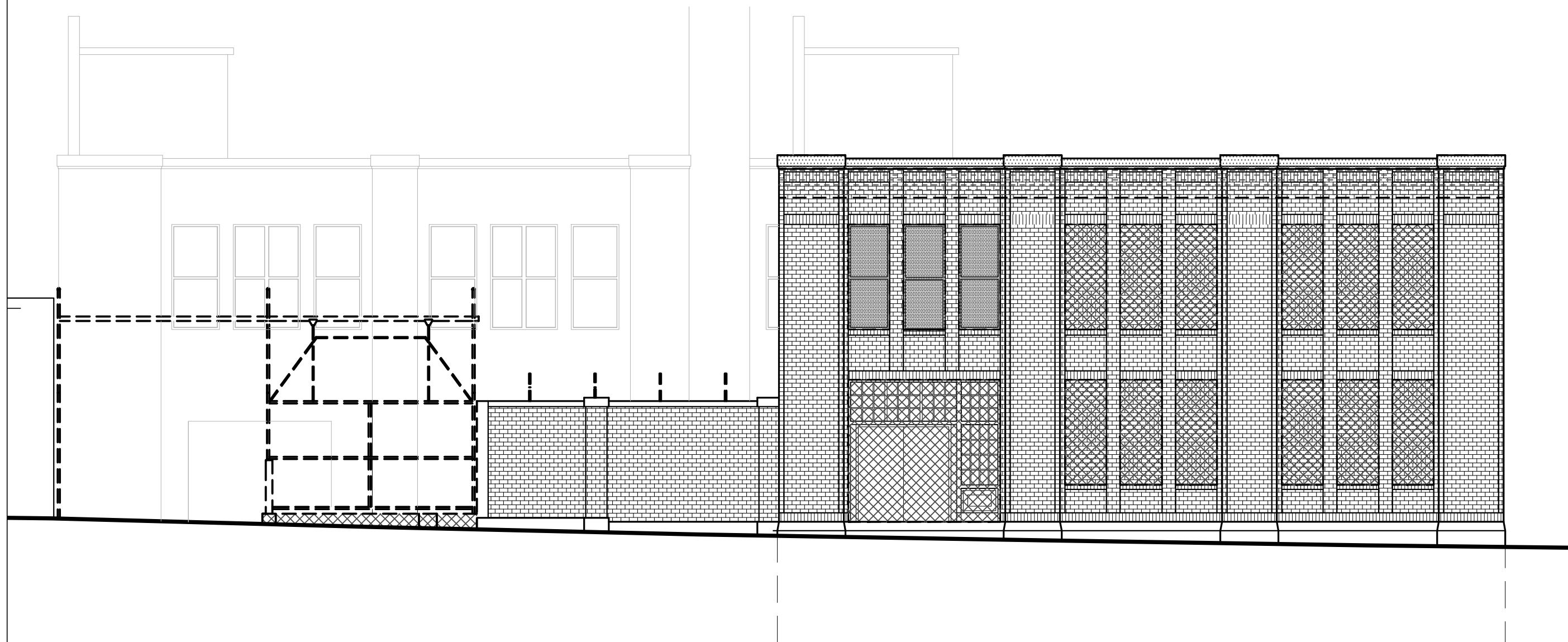
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D104.00

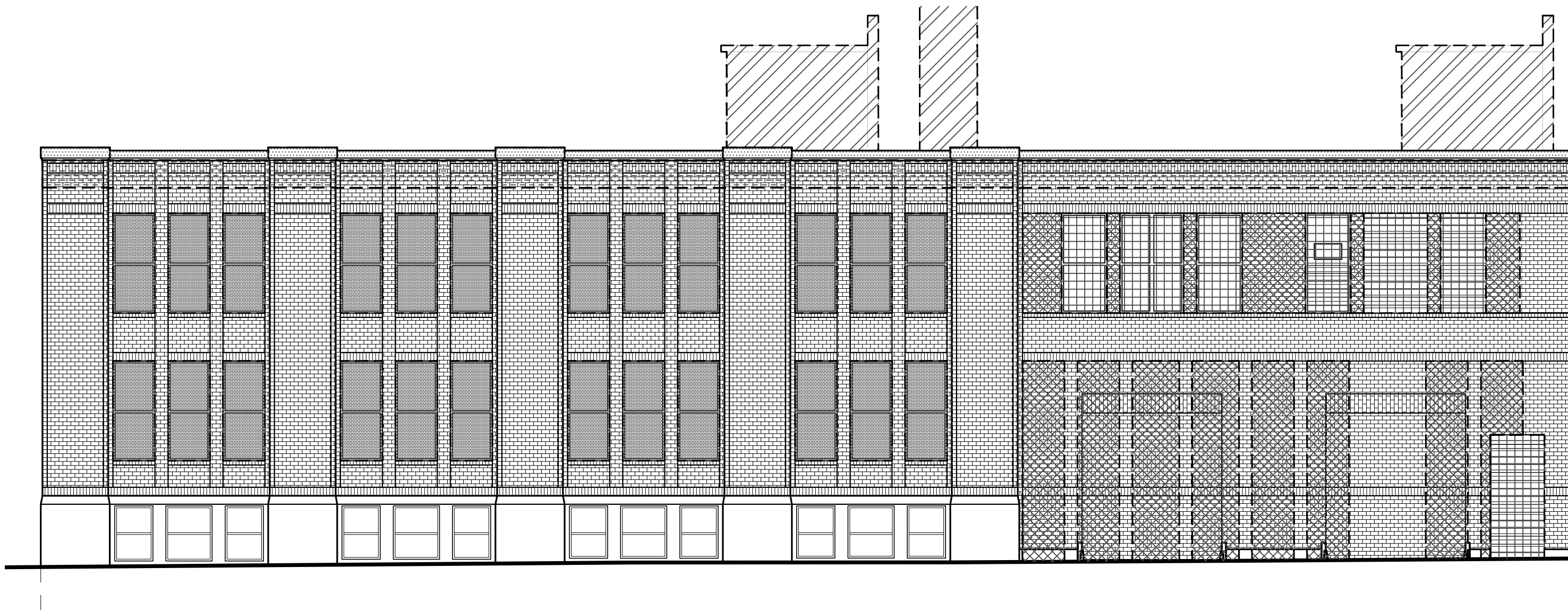
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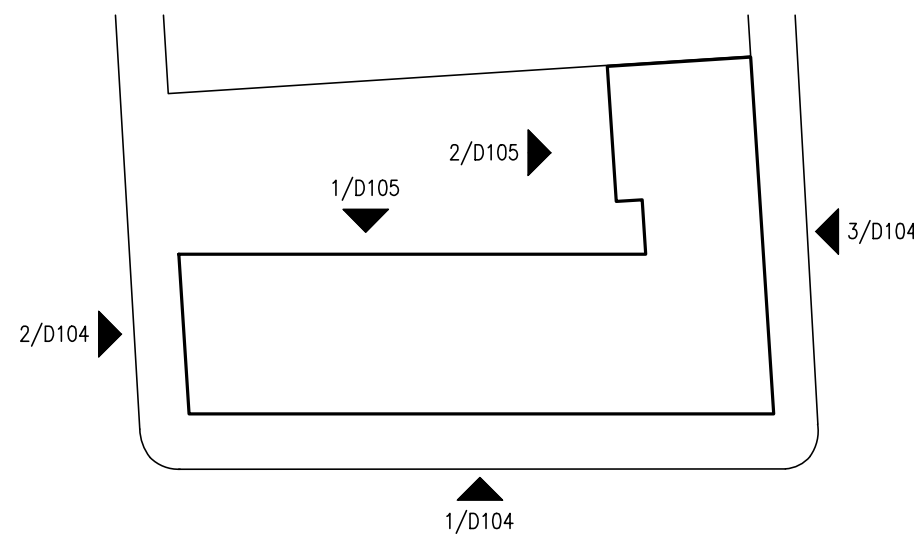
1 SOUTH ELEVATION  
SCALE: 1/8" = 1'-0"



2 EAST ELEVATION  
SCALE: 1/8" = 1'-0"



3 WEST ELEVATION  
SCALE: 1/8" = 1'-0"



DEMOLITION GENERAL NOTES

- REFER TO GENERAL NOTES FOR PROJECT, SHEET A-001, AND ASBESTOS ABATEMENT NOTES
- CONTRACTOR SHALL FAMILIARIZE HIMSELF/HERSELF WITH EXISTING CONDITIONS IN FIELD. CONTRACTOR SHALL REPORT ANY DISCREPANCIES BETWEEN DRAWINGS AND FIELD CONDITIONS PRIOR TO COMMENCEMENT OF WORK AND SHALL VERIFY ACCEPTABLE BUILDING HOURS FOR ALL DEMOLITION WORK AND REMOVALS PRIOR TO STARTING WORK.
- ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE APPLICABLE PROVISIONS OF THE NEW YORK CITY BUILDING CODE INCLUDING, BUT NOT LIMITED TO, CHAPTER 33, "SAFEGUARDS DURING CONSTRUCTION AND DEMOLITION."
- WORK SHALL CONFORM TO THE LATEST EDITION OF ALL APPLICABLE REFERENCE SPECIFICATIONS AND TO GOVERNING BUILDING CODES AND REQUIREMENTS OF LOCAL LAWS HAVING JURISDICTION.
- PRIOR TO WORK, CONTRACTOR SHALL ASSURE THAT ALL REQUIRED PERMITS AND APPROVALS ARE FILED AND APPROVED. COMPLIANCE WITH THE DRAWINGS AND SPECIFICATIONS IS REQUIRED TO ASSURE STRICT COMPLIANCE WITH NEW YORK CITY LANDMARKS PRESERVATION COMMISSION APPROVALS.
- PROVIDE PROTECTION FOR EXISTING ADJACENT BUILDING TO REMAIN. PROVIDE SHORING AS NECESSARY. PROVIDE INTERIOR AND EXTERIOR SHORING, BRACING, AND/OR SUPPORT TO PREVENT MOVEMENT, SETTLEMENT OR COLLAPSE OF STRUCTURES TO BE DEMOLISHED AND ADJACENT CONSTRUCTION TO REMAIN.
- CONTRACTOR SHALL EMPLOY OR COORDINATE WITH PROJECT STRUCTURAL ENGINEER/ LICENSED IN THE STATE OF NEW YORK, TO ASSIST IN DETERMINING CORRECT METHODS AND MATERIALS TO BE USED FOR SHORING, BRACING, PINNING, ETC. OF EXISTING STRUCTURE TO REMAIN.
- CONTRACTOR SHALL PROVIDE ALL NECESSARY PROBE HOLES PRIOR TO SAW CUTTING OF EXISTING SUB-CELLAR/CELLAR FLOOR SLAB FOR NEW OPENINGS OR PITS.
- EXISTING BUILDING SYSTEMS SUCH AS FIRE SYSTEMS, PLUMBING AND ELECTRICAL RISERS, AND HVAC SYSTEMS, ETC. ARE TO BE PROTECTED FROM DAMAGE AND CAPPED AND/OR TIED OFF AS REQUIRED. ANY SHUT-OFFS REQUIRED SHALL BE THE CONTRACTOR'S RESPONSIBILITY AND CONTRACTOR SHALL ARRANGE SUCH SHUT-OFFS WITH BUILDING MANAGEMENT. REFER TO MEP PLANS FOR EXTENT OF MECHANICAL, ELECTRICAL AND PLUMBING DEMO/WORK. PROVIDE TEMPORARY PROTECTION FOR EXISTING UTILITY METERS & SERVICES TO REMAIN. REFER TO MEP DEMOLITION DRAWINGS.
- GENERAL CONTRACTOR IS RESPONSIBLE FOR DISCARDING ALL RUBBISH FROM THE JOB SITE, INCLUDING THAT LEFT BY VENDORS OR SUBCONTRACTORS CONTRACTED DIRECTLY BY THE CLIENT AND THE CLEANING OF ALL AREAS AT THE COMPLETION OF EACH DAY'S WORK.
- CONTRACTOR TO VERIFY ALL EXISTING CONDITIONS AND REPORT TO THE OWNER/ARCHITECT ANY DISCREPANCIES BETWEEN DRAWINGS AND FIELD CONDITIONS PRIOR TO COMMENCEMENT OF WORK. CONTRACTOR SHALL PERFORM A PUNCH LIST TO NOTE EXISTING CONDITIONS WHICH MAY INCUR ADDITIONAL COSTS.
- PHOTOGRAPHS OF EXISTING CONDITIONS OF STRUCTURE, SURFACES, AND EQUIPMENT, THAT MIGHT BE MISCONSTRUED AS DAMAGE RELATED TO DEMOLITION OPERATIONS, SHALL BE SUBMITTED TO OWNER/ARCHITECT PRIOR TO COMMENCEMENT OF WORK.
- CONTRACTOR TO PROVIDE ALL NECESSARY PROVISION TO DE-WATER THE EXISTING/NEW CELLAR LEVEL DURING THE COURSE OF CONSTRUCTION IF REQUIRED.
- REMOVAL OF EXISTING PLUMBING FIXTURES IN AREA OF WORK SHALL BE DONE AS FOLLOWS: ALL EXPOSED HORIZONTAL AND VERTICAL PIPE NOT TO BE REUSED, TO BE CUT OFF AND CAPPED BACK TO RISER. REFER TO MEP DEMO DRAWINGS.
- CONTRACTOR SHALL BE SOLELY RESPONSIBLE FOR CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, AND SAFETY PRECAUTIONS, INCLUDING WORK NECESSARY TO SUPPORT EXISTING CONSTRUCTION. CONTRACTOR SHALL CORRECT, AT NO ADDITIONAL COST TO THE OWNER, DAMAGE CAUSED BY MOVEMENT OR SETTLEMENT DUE TO INADEQUATE OR IMPROPER SUPPORT.
- ALL FLOOR PENETRATIONS SHALL BE STRUCTURALLY SHORED AS NECESSARY PRIOR TO DEMO. DO NOT REMOVE OR CUT AND PATCH STRUCTURAL WORK IN A MANNER THAT WOULD RESULT IN A REDUCTION OF LOAD CARRYING CAPACITY OR LOAD/DEFLECTION RATIO, UNLESS SPECIFICALLY INDICATED OR ADEQUATE TEMPORARY SUPPORT IS PROVIDED.
- CONTRACTOR SHALL PROTECT EXISTING FINISHED WORK THAT IS TO REMAIN IN PLACE AND BECOMES EXPOSED DURING DEMOLITION OPERATIONS FROM DAMAGE. REMOVE AND DISPOSE OF TEMPORARY PROTECTIONS AT COMPLETION OF WORK OR WHEN NO LONGER NECESSARY.
- GC TO COORDINATE THE EXTENT OF DEMOLITION AREA W/ NEW CONSTRUCTION ARCHITECTURAL, STRUCTURAL & MEP DETAILS.
- SEE CIVIL DRAWINGS FOR LOCATIONS OF ALL SITE UTILITY, SIDEWALK DEMOLITION AND TREE REMOVAL.
- GC TO PROTECT BUILDING INTERIOR FROM WEATHER & ELEMENTS AS A RESULT OF EXTERIOR WALL DEMOLITION WORK FOR THE DURATION OF THE PROJECT. REFER TO DEMO ELEVATION SHEETS FOR EXTENT OF NEW WINDOW OPENINGS.
- A TEMPORARY SIDEWALK SHED SHALL BE ERRECTED AND FILED UNDER SEPARATE APPLICATION.
- INTERIOR DEMO WORK TO INCLUDE THE FOLLOWING:  
A. REMOVE INTERIOR PARTITION WALLS AS INDICATED ON PLANS INCLUDING ALL ASSOCIATED ELECTRICAL/TEL/DATA  
B. REMOVE ALL FINISHED FLOOR DOWN TO SUBFLOOR UNLESS NOTED OTHERWISE.  
C. REMOVE ALL CEILING TO STRUCTURE ABOVE AND ALL ASSOCIATED BLACK IRON AND LIGHT FIXTURES, HVAC EQUIPMENT AND DUCTWORK TO REMAIN. REFER TO MEP DEMO DRAWINGS.  
D. OTHER DEMOLITION SHALL BE PERFORMED AS NECESSARY.

DEMO PLAN LEGEND

- EXISTING WALLS, DOORS, FRAMES AND FINISHES TO BE REMOVED
- EXISTING CONSTRUCTION TO REMAIN
- APPROXIMATE AREA OF FLOOR/CEILING OR ROOF TO BE DEMOLISHED
- PART EXISTING EXTERIOR OR INTERIOR MASONRY WALL TO BE DEMOLISHED. REFER TO STRUCTURAL DWGS

DEMO ELEVATION LEGEND

- AREAS TO BE INFILLED WITH BRICK TO MATCH EXISTING AFTER DEMOLITION. REFER TO BRICK INFILL DETAIL.
- BULKHED STRUCTURES, CHIMNEYS, AND OTHER ROOF TOP STRUCTURES TO BE COMPLETELY REMOVED
- EXISTING WINDOW AND FRAME, DOOR AND FRAME, LOUVER, OR COILING DOOR TO BE REMOVED AND DISCARDED.
- AREA OF EXTERIOR WALL TO BE DEMOLISHED. REFER TO STRUCTURAL DWGS. COMPLETELY REMOVE EXISTING ENTRANCE DOORS, WINDOWS, SIGNAGE, AND NON-ORIGINAL CLADDING. EXISTING REMOVED FACE BRICK TO BE SAVED ON-SITE FOR RE-USE AS INFILL BRICK WHERE REQUIRED.
- EXISTING BRICK PARAPET WALL / FACE BRICK TO BE REMOVED. EXISTING REMOVED FACE BRICK TO BE SAVED ON-SITE FOR RE-USE AS INFILL BRICK WHERE REQUIRED.
- EXISTING STONE PARAPET CAP TO BE REMOVED

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## ISSUE/REVISION RECORD

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## PROFESSIONAL SEAL



## PROFESSIONAL IN CHARGE

SCOTT LOIKITS

## PROJECT MANAGER

ADELE PERERA

## QUALITY CONTROL

WARREN DRURY

## DRAWN BY

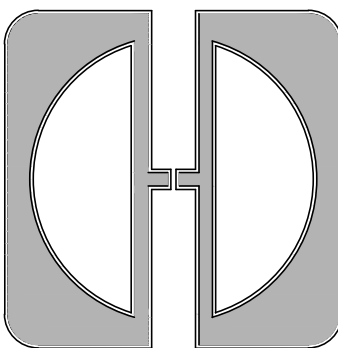
DEVIN MURRAY

## PROJECT NAME

**38TH AVE  
RESIDENTIAL  
DEVELOPMENT****LONG ISLAND CITY  
NEW YORK CITY**

33-01 38TH AVENUE

LONG ISLAND CITY, NY 11101

**THE HAKIMIAN  
ORGANIZATION**

## PROJECT NUMBER

20140590.0

## SHEET TITLE

**CELLAR PLAN**

## SHEET NUMBER 13 OF 43

**A100.00**

NOT ISSUED FOR CONSTRUCTION

33RD STREET

34TH STREET

38TH AVENUE

## CONSTRUCTION PLAN LEGEND

- |  |  |
|--|--|
|  | EXISTING CONSTRUCTION                  |
|  | APARTMENT PARTITION. REFER TO WALL TAG |
|  | 1 HR. RATED SEPARATION/DIVISION        |
|  | 2 HR. RATED SEPARATION/DIVISION        |

- |  |   |
|--|---|
|  | DOOR TAG. SEE DOOR SCHED.   |
|  | WALL TAG. SEE PARTITION SCHED.  |
|  | APPROXIMATE AREA OF NEW FLOOR CONSTRUCTION TO BE FLUSH AND ALIGN WITH EXISTING ADJACENT FLOOR. SEE STRUCTURAL DRAWINGS. |

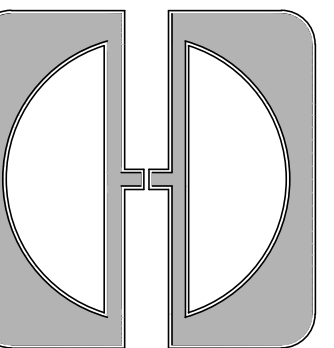
## NOTES

1. ALL EXISTING CONDITIONS ARE TO BE V.I.F. GC TO NOTIFY ARCHITECT AND ENGINEERS IF EXISTING CONDITIONS DO NOT COORDINATE WITH PROVIDED DRAWINGS.

**1 CELLAR FLOOR PLAN**

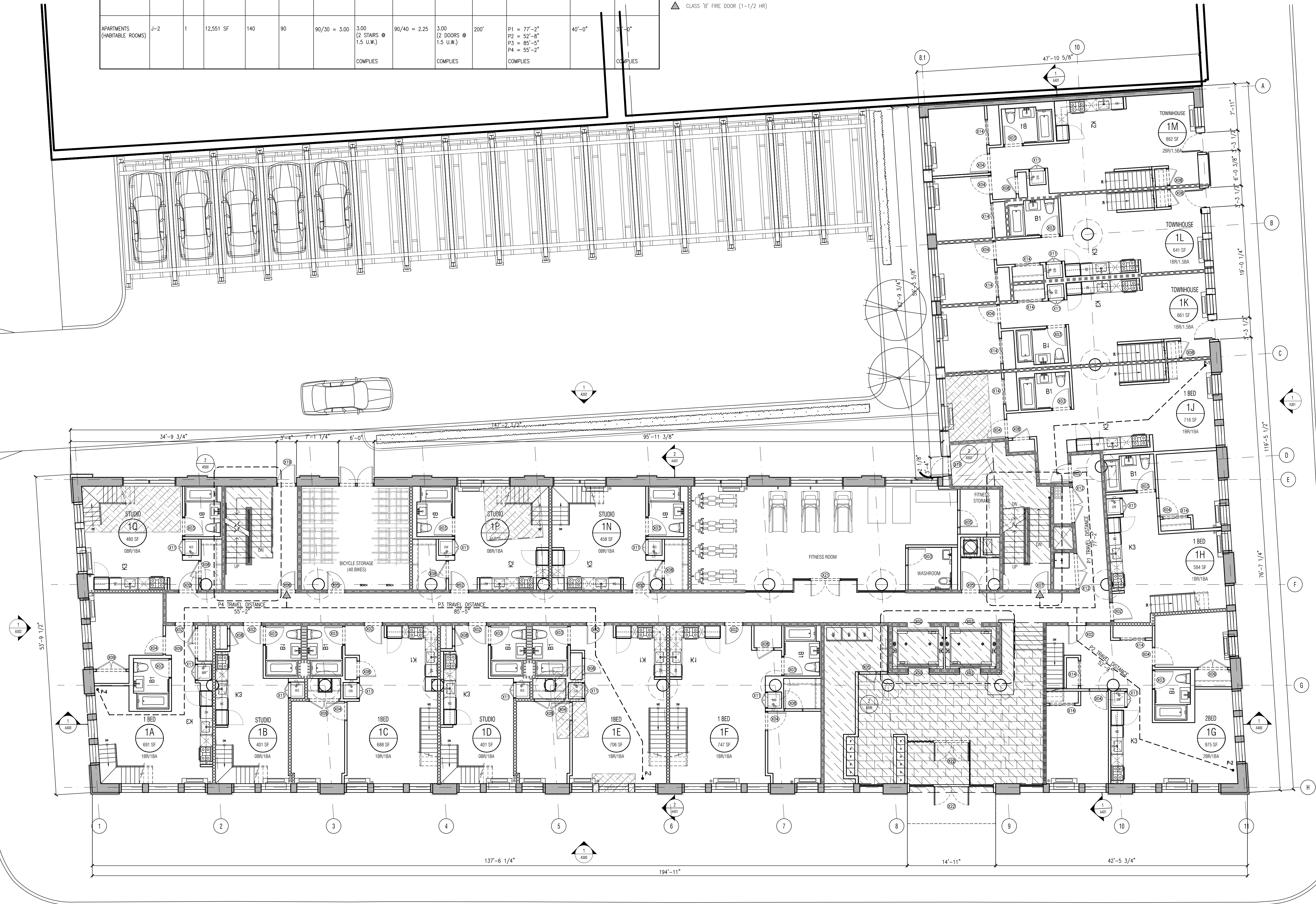
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ROOM/SPACE	OCCUPANCY GROUP	FIRE INDEX	NET FLOOR AREA (SQUARE FEET)	NET FLOOR AREA PER OCCUPANT	OCCUPANTS	REQUIRED EXIT UNITS FOR STAIRS	EXIT UNITS PROVIDED @ STAIRS	REQUIRED EXIT UNITS FOR DOORS	EXIT UNITS PROVIDED @ DOORS	MAX. TRAVEL DISTANCE PERMITTED	TRAVEL DISTANCES PROVIDED	MAX. DEAD END DISTANCE PERMITTED	END DISTANCE PROVIDED
APARTMENTS (HABITABLE ROOMS)	J-2	1	12,551 SF	140	90	90/30 = 3.00	3.00 (2 STAIRS @ 1.5 U.W.)  COMPLIES	90/40 = 2.25	3.00 (2 DOORS @ 1.5 U.W.)  COMPLIES	200'	P1 = 77'-2" P2 = 52'-8" P3 = 85'-5" P4 = 55'-2"  COMPLIES	40'-0"	3'-0"  COMPLIES




△ CLASS 'B' FIRE DOOR (1-1/2 HR)



### CONSTRUCTION PLAN LEGEND

- |   |  |
|---|--|
|  | EXISTING CONSTRUCTION                  |
|  | APARTMENT PARTITION. REFER TO WALL TAG |
|  | 1 HR RATED SEPARATION/DIVISION         |
|  | 2 HR RATED SEPARATION/DIVISION         |

NOTES

-  DOOR TAG. SEE DOOR SCHED.
-  WALL TAG. SEE PARTITION SCHED.
-  APPROXIMATE AREA OF NEW FLOOR CONSTRUCTION  
TO BE FLUSH AND ALIGN WITH EXISTING  
ADJACENT FLOOR. SEE STRUCTURAL DRAWINGS.

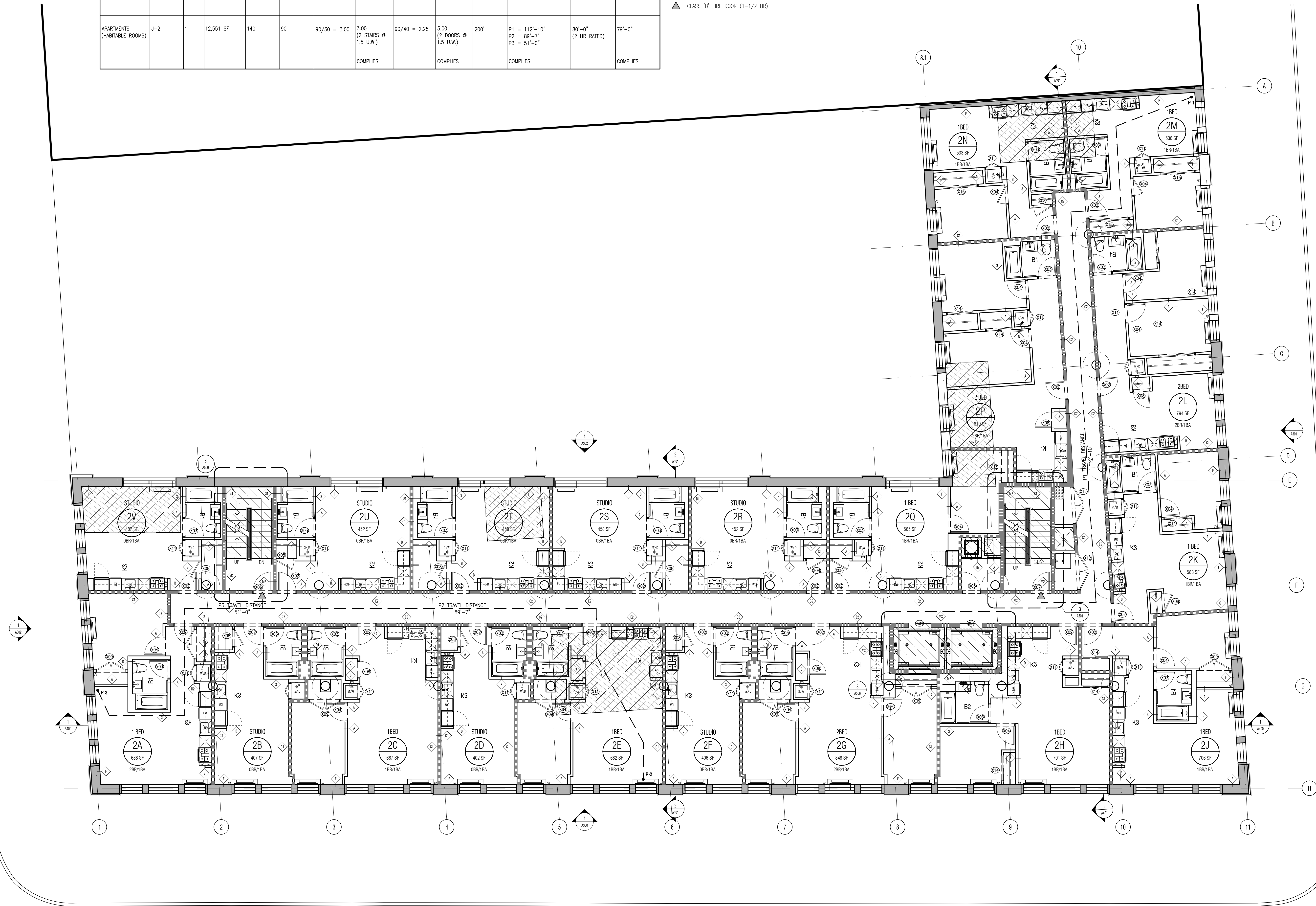
1. ALL EXISTING CONDITIONS ARE TO BE V.I.F. GC TO NOTIFY ARCHITECT AND ENGINEERS IF EXISTING CONDITIONS DO NOT COORDINATE WITH PROVIDED DRAWINGS.

Drawing Name: P:\2014\201405003\600 Design Development\Produced\Current\201405003\_A101 - 1st Floor Plan.dwg Last Modified: Sep 22, 2014 - 10:46am Plotted on: Sep 22, 2014 - 11:56am by dmurray

OCCUPANCY LOAD & EGRESS CALCULATIONS

ROOM/SPACE	OCCUPANCY GROUP	FIRE INDEX	NET FLOOR AREA (SQUARE FEET)	NET FLOOR AREA PER OCCUPANT	OCCUPANTS	REQUIRED EXIT UNITS FOR STAIRS	EXIT UNITS PROVIDED @ STAIRS	REQUIRED EXIT UNITS FOR DOORS	EXIT UNITS PROVIDED @ DOORS	MAX TRAVEL DISTANCE PERMITTED	TRAVEL DISTANCES PROVIDED	MAX DEAD END DISTANCE PERMITTED	MAX DEAD END DISTANCE PROVIDED
APARTMENTS (HABITABLE ROOMS)	J-2	1	12,551 SF	140	90	90/50 = 3.00	3.00 (2 STAIRS @ 1.5 U.W.)	90/40 = 2.25	3.00 (2 DOORS @ 1.5 U.W.)	200'	P1 = 112'-10" P2 = 89'-7" P3 = 51'-0"	80'-0" (2 HR RATED)	79'-0"
							COMPLIES		COMPLIES		COMPLIES		COMPLIES

- △ CLASS 'A' FIRE DOOR (3/4 HR)  
△ CLASS 'B' FIRE DOOR (1-1/2 HR)



CONSTRUCTION PLAN LEGEND

- EXISTING CONSTRUCTION  
APARTMENT PARTITION. REFER TO WALL TAG  
1 HR. RATED SEPARATION/DIVISION  
2 HR. RATED SEPARATION/DIVISION

- DOOR TAG. SEE DOOR SCHED.  
WALL TAG. SEE PARTITION SCHED.  
APPROXIMATE AREA OF NEW FLOOR CONSTRUCTION TO BE FLUSH AND ALIGN WITH EXISTING ADJACENT FLOOR. SEE STRUCTURAL DRAWINGS.

NOTES

1. ALL EXISTING CONDITIONS ARE TO BE V.I.F. GC TO NOTIFY ARCHITECT AND ENGINEERS IF EXISTING CONDITIONS DO NOT COORDINATE WITH PROVIDED DRAWINGS.

1 SECOND FLOOR PLAN  
SCALE: 1/8" = 1'-0"

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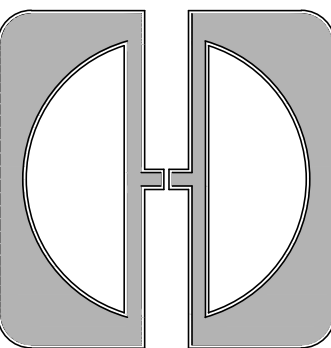
PROFESSIONAL SEAL



**PROFESSIONAL IN CHARGE**  
SCOTT LOHKITS  
**PROJECT MANAGER**  
ADELE PERERA  
**QUALITY CONTROL**  
WARREN DRURY  
**DRAWN BY**  
DEVIN MURRAY

**PROJECT NAME**  
**38TH AVE  
RESIDENTIAL  
DEVELOPMENT**  
**LONG ISLAND CITY  
NEW YORK CITY**

**33-01 38TH AVENUE  
LONG ISLAND CITY, NY 11101**



**THE HAKIMIAN  
ORGANIZATION**

**PROJECT NUMBER**  
20140590.0

**SHEET TITLE**  
**SECOND FLOOR PLAN**

**SHEET NUMBER 15 OF 43**

**A102.00**

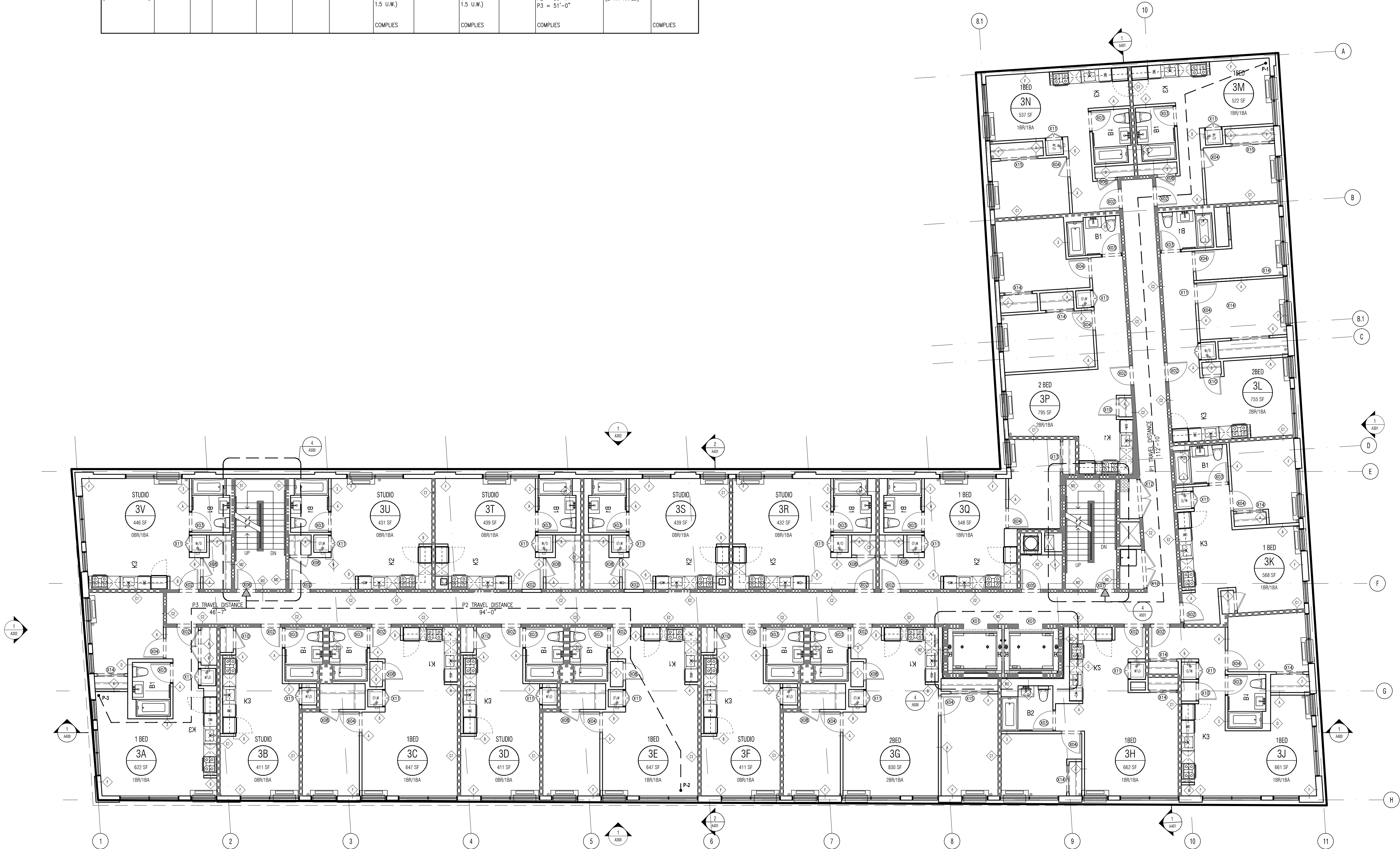
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OCCUPANCY LOAD & EGRESS CALCULATIONS

ROOM/SPACE	OCCUPANCY GROUP	FIRE INDEX	NET FLOOR AREA (SQUARE FEET)	NET FLOOR AREA PER OCCUPANT	OCCUPANTS	REQUIRED EXIT UNITS FOR STAIRS	EXIT UNITS PROVIDED @ STAIRS	REQUIRED EXIT UNITS FOR DOORS	EXIT UNITS PROVIDED @ DOORS	MAX TRAVEL DISTANCE PERMITTED	TRAVEL DISTANCES PROVIDED	MAX DEAD END DISTANCE PERMITTED	MAX DEAD END DISTANCE PROVIDED
APARTMENTS (HABITABLE ROOMS)	J-2	1	12,551 SF	140	90	90/50 = 3.00	3.00 (2 STAIRS @ 1.5 U.W.)	90/40 = 2.25	3.00 (2 DOORS @ 1.5 U.W.)	200'	P1 = 112'-10" P2 = 89'-7" P3 = 51'-0"	80'-0" (2 HR RATED)	79'-0"
							COMPLIES		COMPLIES		COMPLIES		COMPLIES

- △ CLASS 'A' FIRE DOOR (3/4 HR)  
△ CLASS 'B' FIRE DOOR (1-1/2 HR)



CONSTRUCTION PLAN LEGEND

- EXISTING CONSTRUCTION  
APARTMENT PARTITION. REFER TO WALL TAG  
1 HR. RATED SEPARATION/DIVISION  
2 HR. RATED SEPARATION/DIVISION

NOTES

- DOOR TAG. SEE DOOR SCHED.  
WALL TAG. SEE PARTITION SCHED.  
APPROXIMATE AREA OF NEW FLOOR CONSTRUCTION TO BE FLUSH AND ALIGN WITH EXISTING ADJACENT FLOOR. SEE STRUCTURAL DRAWINGS.

1. ALL EXISTING CONDITIONS ARE TO BE V.I.F. GC TO NOTIFY ARCHITECT AND ENGINEERS IF EXISTING CONDITIONS DO NOT COORDINATE WITH PROVIDED DRAWINGS.

1 TYPICAL 3RD-5TH FLOOR PLAN  
SCALE: 1/8" = 1'-0"

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09/22/14	DOB SUBMITTAL

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PROFESSIONAL IN CHARGE

SCOTT LOIKITS

PROJECT MANAGER

ADELE PERERA

QUALITY CONTROL

WARREN DRURY

DRAWN BY

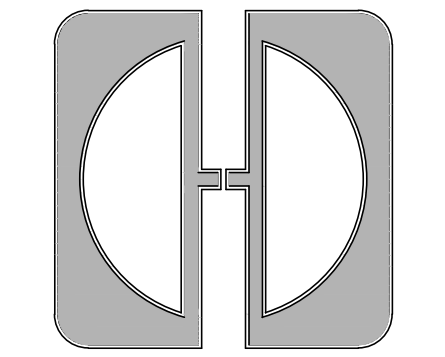
DEVIN MURRAY

PROJECT NAME

**38TH AVE  
RESIDENTIAL  
DEVELOPMENT**

**LONG ISLAND CITY  
NEW YORK CITY**

**33-01 38TH AVENUE  
LONG ISLAND CITY, NY 11101**



**THE HAKIMIAN  
ORGANIZATION**

PROJECT NUMBER

20140590.0

SHEET TITLE

**THIRD THRU FIFTH  
FLOOR PLAN**

SHEET NUMBER 16 OF 43

**A103.00**

NOT ISSUED FOR CONSTRUCTION



ELEVATION NOTES:

- |     |  |
|-----|--|
| EL1 | ROMAN STYLE BRICK                        |
| EL2 | PRECAST BASE (TO MATCH EXISTING)         |
| EL3 | LOWERED PARAPET CAP(SEE DEMO ELEVATIONS) |
| EL4 | DRI-DESIGN METAL WALL PANEL SYSTEM       |
| EL5 | BRICK PARAPET CAP                        |
| EL6 | MATCH EXISTING BRICK                     |
| EL7 | INFILL TO MATCH EXISTING                 |

LEGEND

- 
- A3-01
- FLOOR
  - M= MEZZANINE
  - MATERIAL
  - A= ALUMINUM-CLAD
  - M= STEEL
  - W= WOOD
  - S= STOREFRONT
  - C= CURTAIN WALL

Drawing Name: P:\2014\20140500\400 Design Development\Produced\Current\20140500\_A300-301 - Elevations.dwg Last Modified: Sep 22, 2014 - 11:01am Plotted on: Sep 22, 2014 - 11:58am by dmsurrey

# APPENDIX B

## Health and Safety Plan



**33-01 38<sup>th</sup> Avenue  
Queens, New York  
Block 375, Lot 33**

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# **CONSTRUCTION HEALTH AND SAFETY PLAN**

**Prepared For:**

38th Avenue Partners LLC  
8 West 40th Street  
New York, NY 10018

**Submitted to:**

New York City Office of Environmental Remediation  
100 Gold Street, 2<sup>nd</sup> Floor  
New York, NY 10038  
OER Project Number 15EHAN008M

**Prepared by:**



*Fleming  
Lee Shue*

*Environmental Management & Consulting  
158 West 29th Street, 9th Floor  
New York, New York 10001  
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DECEMBER 2014

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II	Profiles of Chemicals of Concern/Material Safety Data Sheets
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IV	Construction Equipment Safety Rules



## 1.0 INTRODUCTION

Fleming-Lee Shue, Inc. (FLS) has prepared this Health and Safety Plan (HASP) on behalf of 38<sup>th</sup> Avenue Partners LLC for the 33-01 38<sup>th</sup> Avenue Site (Site) located at 33-01 38<sup>th</sup> Avenue, Queens, New York. The Site is defined on the New York City Tax Map as Block 375, Lot 33. A site location map is provided in Figure 1.

The purpose of this HASP is to identify the real and potential hazards associated with environmental activities related to and conducted during the planned construction and to stipulate appropriate health and safety procedures, particularly where hazardous materials are potentially present. The procedures and guidelines contained in this document are intended to minimize exposure to chemical, physical and biological hazards that may be present in the soil, groundwater, or air and to reduce the potential for accidents and injuries.

This HASP is based on the premise that accidents are preventable and that accident prevention is the responsibility of all individuals on the project team. Usually accidents are the result of dangerous actions, conditions and/or equipment. Therefore, the goal of this HASP is to prevent all accidents by developing a sense of safety, health awareness, and safe work habits in field and construction personnel, and by ensuring that the safety requirements of this HASP are fulfilled. Strict adherence to these health and safety guidelines will reduce, but not eliminate, the potential for injury on the sites.

The procedures described in this document were developed in accordance with the provisions of Occupational Safety and Health Administration (OSHA) rule 29 CFR 1910.120 and FLS' experience with similar projects. All Site workers must read and comprehend this generic HASP before entering the construction area. The Health and Safety Officer (HSO) or designee will ensure that personnel have reviewed the HASP and will provide an opportunity to ask health and safety questions during attendance at a pre-construction safety meeting. Field personnel will sign the acknowledgment form (Attachment I) maintained on-site at the construction office by the HSO. The recommended health and safety guidelines in this document may be modified, if warranted, by additional information obtained prior to, or during construction. The HSO will also maintain copies of pertinent health and safety records for all field personnel.

The Occupational Safety and Health Act (1970) requires:

- Employers shall furnish each employee with a place of employment free from recognized hazards that are causing or likely to cause death or serious physical harm.
- Employers must comply with occupational health and safety standards and rules, regulations and orders pursuant to the Act, that are applicable to company business and operations.
- All employees must comply with occupational health and safety standards and regulations under the Act, which are applicable to their actions and situations.
- Employees are encouraged to contact their immediate superior for information that will help them understand their responsibilities under the Act.

## 1.1 Site Development Plan

The development project consists of a conversion of the existing building into residential apartments. The renovation will include the addition of three floors and a penthouse to the existing building. Excavation is only anticipated for a new elevator pit and possible small utility trenches. The water table is approximately 14 feet below grade surface (bgs).

## 1.2 Site Description

The Site is located at 33-01 38<sup>th</sup> Avenue in the Chelsea section of Manhattan, New York and is identified as Block 375, Lot 33 on the New York City Tax Map. The Site location is depicted on Figure 1. The Site is 22,276-square feet and is bounded by 38<sup>th</sup> Avenue to the south, 33<sup>rd</sup> Street to the west, 34<sup>th</sup> Street to the east and warehouse building to the north

## 1.3 Previous Site Investigation Results

The following environmental work plans and reports were developed for the Site:

- *Phase I Environmental Site Assessment: 33-01 38<sup>th</sup> Avenue*, July 2014, prepared by Fleming-Lee Shue, Inc.
- *Remedial Investigation Report, 33-01 38<sup>th</sup> Avenue*, December 2014, prepared by Fleming-Lee Shue, Inc.

## 2.0 POTENTIAL CHEMICAL AND PHYSICAL HAZARDS

### 2.1 Potential Chemical Hazards

This HASP focuses on the following chemicals of concern:

- Volatile organic compounds
- Lead

Attachment II lists the Recognized and Suspected Health Hazards and permissible exposure limits for the chemicals known to be present at the Site. Material Safety Data Sheets (MSDS) for these chemicals are also included in Attachment II. The chemical hazards will be minimized by limiting exposure of personnel to hazardous conditions and by the use of personnel protective equipment (PPE).

### 2.2 Physical Hazards

Physical hazards potentially present at the site include, but are not limited to, the following:

- Slips, trips, and falls (uneven terrain, excavations, and slippery surfaces) hazards;

- Environmental (heat/cold) stress;
- Noise hazards; and
- Use of heavy equipment

Physical hazards associated with lockout/tag-out, scaffolds, confined spaces and other construction equipment are addressed in Sections 3.9 and 4 of this HASP. A discussion of heat stress and cold stress and related illnesses is provided in Attachment III.

### **2.3 Biological Hazards**

General biological hazards present at the site include, but are not limited to, the following:

- Bites or stings from insects (particularly ticks) resulting in skin inflammation, disease, or allergic response; and
- Allergens and toxins from plants and animals, producing dermatitis, rhinitis, or asthma.

### **3.0 HEALTH AND SAFETY PROTOCOL**

#### **3.1 Site/Work Hazard Evaluation**

Upon review of contaminant levels, physical and biological hazards, exposure routes and the nature of the construction tasks, it has been determined that Level D protection will be used during construction activities. Personal protection levels are described in more detail in Section 3.6 and air monitoring is discussed in Section 5.

#### **3.2 Project Team Organization**

All personnel who participate in field activities will be required to attend a Health and Safety meeting prior to the commencement of field activities. The project team organization is shown on Table 1, and the roles are described below.

##### **Health and Safety Officer (HSO)**

- Administers all aspects of the occupational health and safety program;
- Develops programs and technical guidance to identify and remove physical, chemical, and biological hazards from facilities, operations, and sites;
- Assists management and supervisors in the health and safety training of employees;
- Conducts inspections to identify unhealthy or unsafe conditions or work practices;
- Investigates all accidents and takes action to eliminate accident causes;
- Monitors to determine the degree of hazard;
- Determines the protection levels and equipment required to ensure the safety of personnel;
- Evaluates on-site conditions (i.e., weather and chemical hazard information) and recommending to the project manager and/or the field coordinator, modifications to the work plan and personnel protection levels;
- Monitors performance of all personnel to ensure compliance with the required safety procedures;
- Ensures that all personnel have been trained in proper site-safety procedures including the use of PPE, and have read and signed the Acknowledgment Form (Attachment I);
- Conducts daily briefings as necessary;
- Halts work if necessary;
- Ensures strict adherence to the Site CHASP; and

- Reviews personnel medical monitoring participation.

### **Project Manager**

- Familiar with health and safety regulations related to area of responsibility.
- Directs and coordinates health and safety activities within area of responsibility.
- Ensures arrangements for prompt medical attention in case of serious injury
- Requires all employees supervised to use individual protective equipment and safety devices.
- Ensures that safety equipment is available, maintained, used, and stored correctly.
- Instructs and trains all persons within area of responsibility in health and safety requirements.
- Conducts frequent and regular health and safety inspections of work area. Directs correction of unsafe conditions.
- Conducts weekly safety briefings with all supervisors and/or workers.
- Requires all subcontractors and subcontractor personnel to comply with health and safety regulations.

### **All Employees**

The minimum personnel qualifications for each individual participating in field activities are:

- OSHA-specific medicals including, but not limited to, audiometric testing under the hearing conservation program and medical approval for the use of respirators;
- Participation in the FLS Occupational Health Monitoring Program;
- Successful completion of the 40-hour OSHA health and safety training for hazardous material sites (29 CFR 1910.120[e][3][i]) and valid/up-to-date 8-hour refresher training (29 CFR 1910.120[e][4]);
- Additionally, it is strongly recommended that all field personnel be trained in first aid and Cardio-Pulmonary Resuscitation (CPR);
- Be familiar with and comply with proper health and safety practices;
- Use the required safety devices and proper personal protective safety equipment; and
- Notify HSO/supervisor immediately of unsafe conditions/acts, accidents, and injuries.

### **3.3 Training**

Knowledge of the safety rules supplemented by compliance is essential to safety. New employees will be provided orientation training and will be furnished information and literature covering the company health and safety policies, rules, and procedures. This orientation training must be provided prior to the employee's visit to the Site.

All employees will have successfully completed the 40-hour OSHA health and safety training for hazardous material sites (29 CFR 1910.120[e][3][i]) and valid/up-to-date 8- hour refresher training (29 CFR 1910.120[e][4]).

Employees must read the CHASP and project-specific Work Plan, which contains the applicable regulations/standards for their job.

Prior to beginning work on-Site, and weekly thereafter, the HSO will lead safety training sessions and/or "tailgate" training meetings. These meetings will be conducted to provide information and training on new equipment, new procedures, new chemicals, refresher/remedial training in specific areas, or meet annual requirements. Such training may be held in conjunction with the safety briefings/meetings addressed elsewhere in this program.

If necessary, the HSO will ensure that employees are scheduled and provided specialized training as required. Examples of specified training include (but are not limited to):

- Safe handling/use of flammables, poisons, or toxics;
- Respirator care/use;
- Hazard communication (hazardous chemicals);
- Slip, trip and fall hazards and fall protection;
- Blood-borne Pathogens (Non-Medical).

Specialized training will be documented in the employees' personnel records and/or in a master training record.

### **3.4 Subcontractor Compliance**

The provisions of these health and safety responsibilities apply to subcontractors and their employees working for FLS. Failure to fulfill this requirement is a failure to meet the conditions of the contract.

### **3.5 Personal Hygiene**

Eating, drinking and the use of tobacco products in the work area are prohibited. The use by site personnel of alcohol or other non-prescription drugs that could impair the ability to function at the work site is prohibited. The use of some prescription drugs may impair the ability to function and can create safety problems on-site. Field personnel taking prescription medication should alert the HSO in case of an emergency. Beards or facial hair that could interfere with the use of a respirator are not permitted. Dermal contact with groundwater should be avoided. This includes avoiding walking through puddles, pools, and mud, sitting

or leaning on or against drums, equipment, or on the ground. Field personnel should wash their hands before eating, smoking, using the toilet, etc. Field personnel should wash their hands and face and shower (daily) as soon as possible after leaving the site.

### **3.6 Levels of Personal Protection**

Personal protective equipment (PPE) must be worn as required for each job in all operations where there is an exposure to hazardous conditions.

#### **3.6.1 Level D**

Level D applies to work in areas where the possibility of contact with potentially contaminated groundwater and soil exists. The protective equipment required for Level D includes, but is not limited to, the following:

- Work clothes or coveralls;
- Safety boots, with steel toe;
- Safety glasses;
- Hard hat;
- Reflective vest;
- Disposable latex gloves;
- Hearing protection, to be used as needed

#### **3.6.2 Level C**

Level C is selected only when the type of material and the concentration are known, and pose a moderate level of respiratory risk to the site worker. Level C is required when PID readings indicate a consistent level of 5 ppm or above of total volatile organics in the worker breathing zone. Level C protection will include, but is not limited to, the following:

- Protective clothing and other equipment required for Level D;
- Full-face air purifying respirator (APR) with high efficiency particulate/organic vapor cartridges (ultra-twin with GMCH cartridges);
- Saranex-coated disposable coveralls with hoods; and
- Boot covers.

### **3.7 General Workplace Safety Rules**

- Report unsafe conditions, accidents, injuries, or incidents to the HSO and Project Manager.
- Use eye and/or face protection where there is danger from flying objects or particles, (such as when grinding, chipping, burning and welding, etc.) or from hazardous chemical splashes.
- Dress properly. Loose clothing and jewelry shall not be worn.

- Keep all equipment in safe working condition. Never use defective tools or equipment.
- Report any defective tools or equipment to immediate supervisor.
- Properly care for and be responsible for all PPE.
- Do not leave materials in aisles, walkways, stairways, work areas, roadways, or other points of egress.
- Practice good housekeeping at all times.
- Training on equipment is required prior to unsupervised operation.
- During work, pause every few minutes and assess surrounding conditions.
- Crossing highways and major roadways is not recommended. Expect movement of cars and buses at any time along any roadway, regardless of traffic signals, stop signs, yield signs, etc.
- When walking on right-of-ways or road-shoulders, keep a sharp lookout in both directions.
- For personal safety, be cognizant of your surroundings and ensure that equipment is properly secured.

### **3.8 Housekeeping**

- Proper housekeeping is the foundation for a safe work environment. It definitely helps prevent accidents and fires, as well as creating a professional appearance in the work area.
- Material will be piled or stored in a stable manner so that it will not be subject to falling.
- Combustible scrap, debris, and garbage shall be removed from the work area at frequent and regular intervals.
- Stairways, walkways, exit doors, in front of electrical panels, or access to fire fighting equipment will be kept clear of materials, supplies, trash, and debris.

### **3.9 Fire Prevention**

- All firefighting equipment shall be conspicuously located, accessible, and inspected periodically, and maintained in operating condition. An annual service check and monthly visual inspections are required for fire extinguisher.
- All employees must know the location of firefighting equipment in the work area and have knowledge of its use and application.



### **3.10 Industrial Hygiene and Occupational Health**

- Toilet facilities shall be provided as required for the number of workers.
- A first aid kit and portable eyewash station shall be kept on site.
- An adequate supply of potable water shall be provided.
- The use of a common drinking cup is prohibited.
- When no medical facility is reasonably accessible (time and distance) to the worksite, a person who has a valid certificate of first aid training will be available at the worksite to render first aid.
- Employees must be protected against exposure to hazardous noise levels by controlling exposure or by use of proper PPE.

### **3.11 Construction Equipment Safety Rules**

A discussion of health and safety issues related FLS employees performing work in the vicinity of common construction elements, such as electrical; compressed gas cylinders; ladders; aerial lifts; cranes; welding and brazing; tools; safety railings and other fall protection; scaffolds; excavations and trenches; motor vehicles and mechanized equipment, is provided in Attachment IV.

## **4.0 INDIVIDUAL HEALTH AND SAFETY PROGRAMS LISTINGS**

OSHA standards specify various individual programs that may be applicable to work performed on construction sites. Highlights of these programs are provided below, and specific written programs or procedures may be included into this written program, attached, or developed separately.

### **4.1 Hazard Communication Program**

If employees are exposed to or work with hazardous chemicals at the job site, this program is required. Important elements of the written program are required to include a master listing of chemicals; maintaining material safety data sheets on each chemical; and training of employees on the program, the chemicals exposed to, and material safety data sheets.

### **4.2 Confined Space Entry Program**

If employees enter a confined space that contains or has the potential to contain an atmospheric or physical hazard, this program is required. Either the ANSI Z117.1-1989 Safety Requirements for Confined Spaces program or the OSHA General Industry Permit Required Confined Spaces program must be used as guidance to develop the company's program. Primary elements of the program are identification of applicable confined spaces, testing/monitoring, control or elimination of hazards, protective equipment, entry authorization, attendants, training, and rescue. No FLS employee is authorized to enter a confined space without the above training and notification to the project manager or HSO.

### **4.3 Respiratory Protection Program**

If employees are exposed to hazardous/toxic chemical, paint or other gases, vapors, fumes, dusts, or mists above the permissible exposure limit, and/or employees wear respirators, this program is required. Program elements are written program for the selection, maintenance, care, and use of respirators; fit testing, training, and employee evaluation for use.

### **4.4 Occupational Noise Exposure/Hearing Conservation Program**

If employees are exposed to noise levels above the permissible noise exposures, protection against the effects of noise and an effective hearing conservation program are required. Such a program would include elements such as written program, noise monitoring, hearing evaluations and follow-on testing, personal protective equipment (hearing protection), and maintenance of medical records.

### **4.5 Emergency Response Plan**

If employees are engaged in emergency response to a hazardous substance/chemical release, an emergency response plan must be developed and implemented to handle anticipated emergencies. Program elements include a written response plan, identification and training of responding employees, medical surveillance and consultation, and post response operations.

### **4.6 Asbestos Control Program**

If employees are exposed to asbestos fibers during construction activities, then an initial monitoring for asbestos exposure must be made. If the monitoring results are above the permissible exposure limit (PEL), this program is required. Program elements include regulated areas, exposure monitoring, medical surveillance and records maintenance, engineering controls, personnel protective equipment, and training.

### **4.7 Lead Exposure Program**

If employees are exposed to lead during construction activities, then an initial monitoring for lead exposure must be made. If the monitoring results are above the permissible exposure limit (PEL), this program is required. Program elements include regulated areas, exposure monitoring, medical surveillance and records maintenance, engineering controls, personnel protective equipment, and training.

### **4.8 Dust Suppression Plan**

The following techniques have been shown to be effective for the controlling of the generation and migration of dust during construction activities:

1. Applying water on haul roads.
2. Wetting equipment and excavation faces.
3. Spraying water on buckets during excavation and dumping.
4. Hauling materials in properly sealed or watertight containers.
5. Restricting vehicle speeds to 10 mph.
6. Covering excavated areas and material after excavation activity ceases.

7. Reducing the excavation size and/or number of excavations.
8. Applying a dust suppressant, such as calcium chloride, in high vehicle traffic areas.

To evaluate the effectiveness of the dust suppression measures, air monitoring utilizing real-time dust-monitoring equipment will be performed. The requirements for air monitoring during post-remediation soil disturbance activities are presented in Section 5.

## 5.0 WORK AREA AIR MONITORING

In addition to the worker breathing zone air monitoring described in Section 3.1, air quality at the work area will also be monitored. During soil excavation, particulate monitoring will be performed using a real-time particulate monitor that will monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

Object to be measured: Dust, Mists, Aerosols

Size range: <0.1 to 10 microns

Sensitivity: 0.001 mg/m<sup>3</sup>

Range: 0.001 to 10 mg/m<sup>3</sup>

Overall Accuracy:  $\pm 10\%$  as compared to gravimetric analysis of stearic acid or reference dust. Particulate levels will be monitored immediately downwind at the working site and integrated over a period not to exceed 15 minutes. The action level will be established at 150 ug/m<sup>3</sup> over the integrated period not to exceed 15 minutes.

## **6.0 DECONTAMINATION**

### **6.1 Site/Work Area Organization**

A typical site work area will consist of an exclusion zone where the actual field activity will take place; a decontamination zone; and a command post located outside the decontamination area and exclusion zones.

Levels of personal protection in the exclusion zone will vary depending on air monitoring data, and will be specified by the Site HSO.

### **6.2 Personnel Decontamination**

Decontamination (decon) of personnel consists of physically removing soil or contaminants using the correct procedures for washing and removal of PPE. Decon will take place in the designated decontamination zone using the following steps, if applicable:

- Soap and potable water wash and potable water rinse of gloves;
- Tyvek removal;
- Glove removal; and
- Field washes of hands and face.

## **7.0 EMERGENCY AND CONTINGENCY PLAN**

Emergency communications will be maintained during all on-site field activities. The emergency route to the hospital is depicted on Figure 2 and emergency contacts and their phone numbers are presented in Table 2.

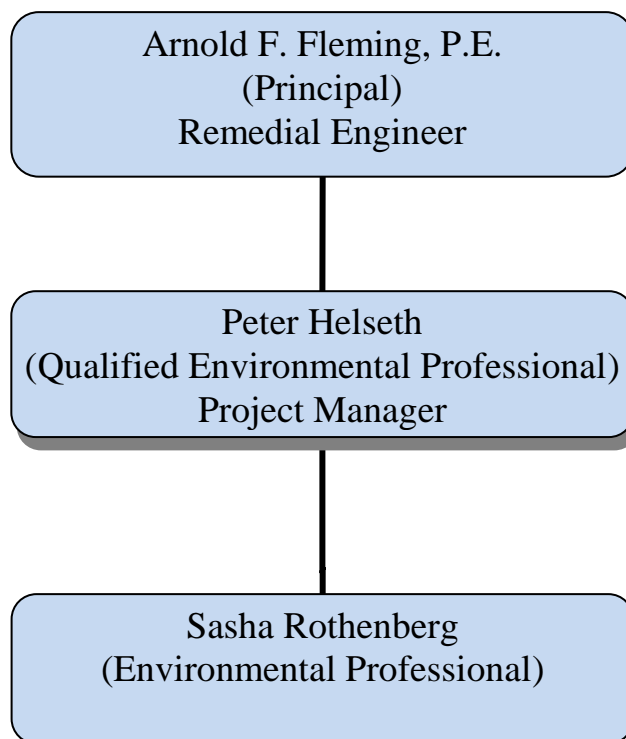
A first aid kit will be available on-site at all times for any minor on-site injuries. Emergency medical assistance or ambulance can be reached by calling 911 for more severe injuries.

All OSHA recordable injuries and illnesses will be reported using OSHA Form 301 (Attachment V).

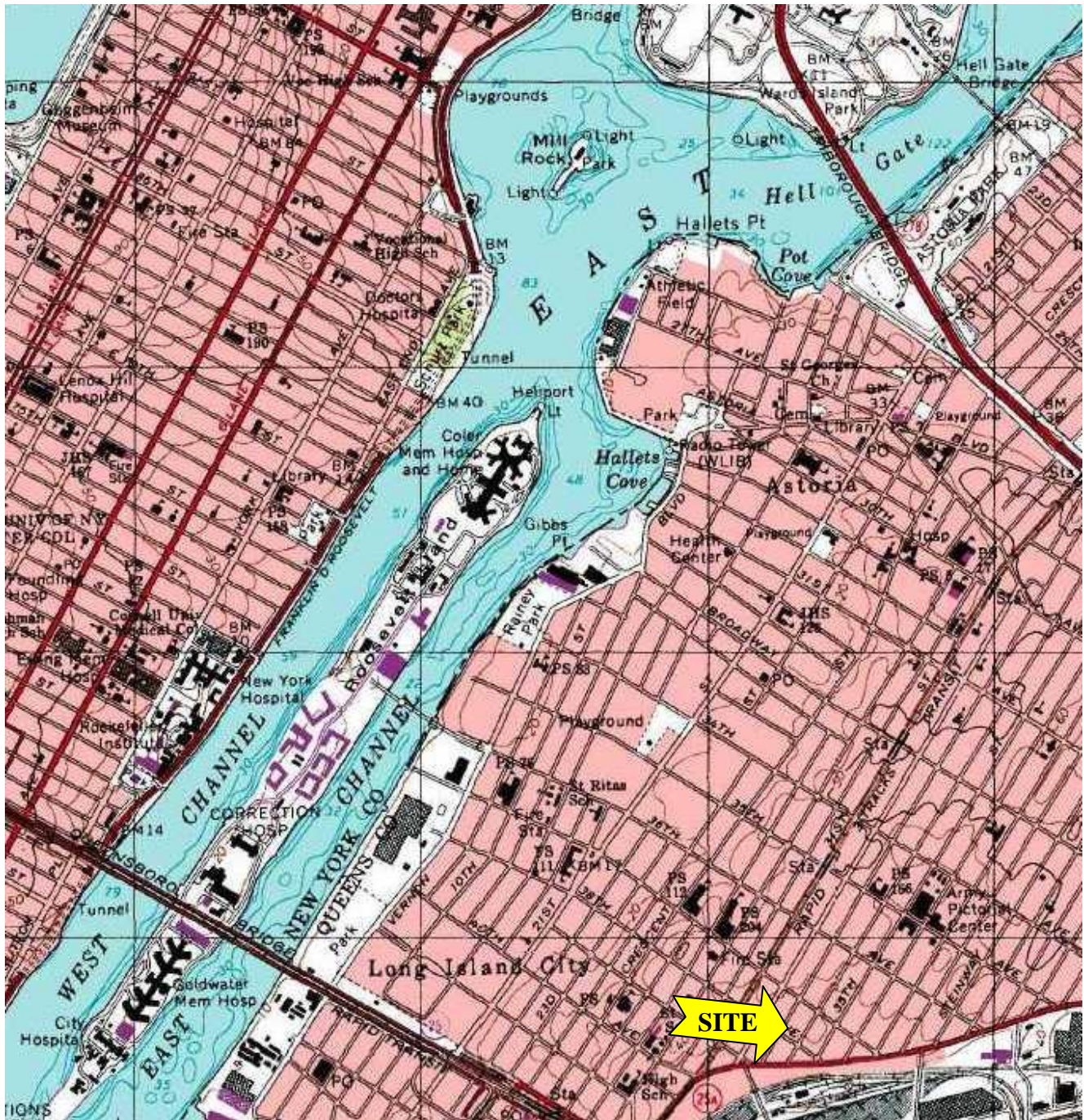
**TABLE 1: EMERGENCY CONTACTS**

<b>Company</b>	<b>Individual Name</b>	<b>Title</b>	<b>Contact Number</b>
FLS	Peter Helseth	Director SS Officer	(212) 675-3225 (office) (914) 329-6449 (cell)
NYC OER	Samantha Morris	Project Manager	(212) 788-3220 (office)
Owner/Developer	Michael Hakimian	Owner	(212) 683-9292 (office)
Ambulance, Fire, & Police Department			911
Spill Hotline			(800) 457-7362

**TABLE 2: PROJECT TEAM ORGANIZATION**







Central Park, NY Quadrangle 7.5 Minute Topographic Map, published by the USGS ©2013

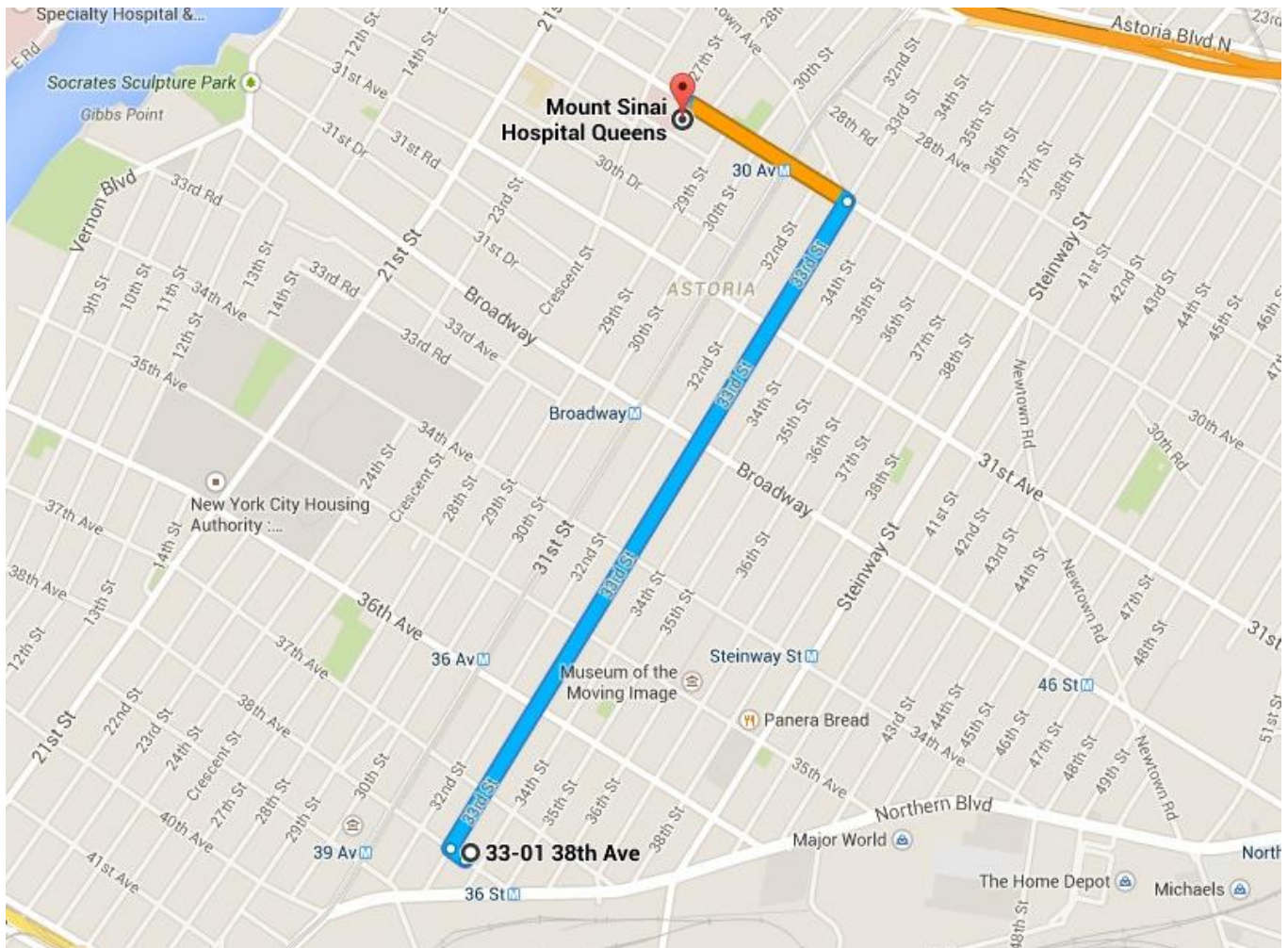
## FIGURE 1: SITE LOCATION MAP

**Fleming  
Lee Shue**

SITE: 33-01 38<sup>th</sup> Avenue  
Queens, NY  
CLIENT: The Hakimian Organization

*Environmental Management & Consulting, 158 West 29<sup>th</sup> Street, 9<sup>th</sup> Fl., New York, NY 10001*





**Mt Sinai Hospital of Queens:**  
25-10 30th Ave, Astoria, NY 11102, US

Directions Distance **Total Est. Time:** 7 minutes **Total Est. Distance:** 1.4 miles

**START**

1: Start out going **NORTHWEST** on 38<sup>th</sup> Avenue toward 33<sup>rd</sup> Street. <0.1 miles



2: Take the first **RIGHT** onto 33<sup>rd</sup> Street. 1.1 miles



4: Turn **LEFT** onto 30<sup>th</sup> Avenue. 0.3 miles

**END**

7: End at **Mt Sinai Hospital of Queens:** 25-10 30<sup>th</sup> Ave, Astoria, NY 11102, US

## FIGURE 2: ROUTE TO THE MOUNT SINAI HOSPITAL OF QUEENS

*Fleming  
Lee Shue*

**SITE:** 33-01 38<sup>th</sup> Avenue, Queens, NY

**CLIENT:** The Hakimian Organization

*Environmental Management & Consulting, 158 West 29<sup>th</sup> Street, New York, NY 10001*

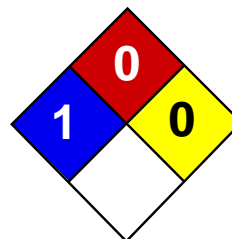
## **ATTACHMENT I**

## HASP ACKNOWLEDGMENT FORM

**The following personnel have read the site-specific HASP and are familiar with its provisions.**

[illegible]

## **ATTACHMENT II**



Health	1
Fire	0
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet

### Lead MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Lead

**Catalog Codes:** SLL1291, SLL1669, SLL1081, SLL1459, SLL1834

**CAS#:** 7439-92-1

**RTECS:** OF7525000

**TSCA:** TSCA 8(b) inventory: Lead

**CI#:** Not available.

**Synonym:** Lead Metal, granular; Lead Metal, foil; Lead Metal, sheet; Lead Metal, shot

**Chemical Name:** Lead

**Chemical Formula:** Pb

#### 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
Lead	7439-92-1	100

**Toxicological Data on Ingredients:** Lead LD50: Not available. LC50: Not available.

#### Section 3: Hazards Identification

**Potential Acute Health Effects:** Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

##### Potential Chronic Health Effects:

Slightly hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, 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:** 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:** Not available.

**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:** May be combustible at high temperature.

**Auto-Ignition Temperature:** Not available.

**Flash Points:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** Some metallic oxides.

**Fire Hazards in Presence of Various Substances:** Non-flammable in presence of open flames and sparks, of shocks, 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.

**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:** When heated to decomposition it emits highly toxic fumes of lead.

**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. 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. 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. If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area.

## 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:** Safety glasses. 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:

TWA: 0.05 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States] TWA: 0.05 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] TWA: 0.03 (mg/m<sup>3</sup>) from NIOSH [United States] TWA: 0.05 (mg/m<sup>3</sup>) [Canada] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid. (Metal solid.)

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 207.21 g/mole

**Color:** Bluish-white. Silvery. Gray

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 1740°C (3164°F)

**Melting Point:** 327.43°C (621.4°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 11.3 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** Not available.

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:** Insoluble in cold water.

## Section 10: Stability and Reactivity Data



**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Incompatible materials, excess heat

**Incompatibility with various substances:** Reactive with oxidizing agents.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Can react vigorously with oxidizing materials. Incompatible with sodium carbide, chlorine trifluoride, trioxane + hydrogen peroxide, ammonium nitrate, sodium azide, disodium acetylide, sodium acetylide, hot concentrated nitric acid, hot concentrated hydrochloric acid, hot concentrated sulfuric acid, zirconium.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Inhalation. Ingestion.

**Toxicity to Animals:**

LD50: Not available. LC50: Not available.

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. May cause damage to the following organs: blood, kidneys, central nervous system (CNS).

**Other Toxic Effects on Humans:** Slightly hazardous in case of skin contact (irritant), 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:**

Acute Potential: Skin: Lead metal granules or dust: May cause skin irritation by mechanical action. Lead metal foil, shot or sheets: Not likely to cause skin irritation Eyes: Lead metal granules or dust: Can irritate eyes by mechanical action. Lead metal foil, shot or sheets: No hazard. Will not cause eye irritation. Inhalation: In an industrial setting, exposure to lead mainly occurs from inhalation of dust or fumes. Lead dust or fumes: Can irritate the upper respiratory tract (nose, throat) as well as the bronchi and lungs by mechanical action. Lead dust can be absorbed through the respiratory system. However, inhaled lead does not accumulate in the lungs. All of an inhaled dose is eventually absorbed or transferred to the gastrointestinal tract. Inhalation effects of exposure to fumes or dust of inorganic lead may not develop quickly. Symptoms may include metallic taste, chest pain, decreased physical fitness, fatigue, sleep disturbance, headache, irritability, reduces memory, mood and personality changes, aching bones and muscles, constipation, abdominal pains, decreasing appetite. Inhalation of large amounts may lead to ataxia, delirium, convulsions/seizures, coma, and death. Lead metal foil, shot, or sheets: Not an inhalation hazard unless metal is heated. If metal is heated, fumes will be released. Inhalation of these fumes may cause "fume metal fever", which is characterized by flu-like symptoms. Symptoms may include metallic taste, fever, nausea, vomiting, chills, cough, weakness, chest pain, generalized muscle pain/aches, and increased white blood cell count. Ingestion: Lead metal granules or dust: The symptoms of lead poisoning include abdominal pain or cramps (lead colic), spasms, nausea, vomiting, headache, muscle weakness, hallucinations, distorted perceptions, "lead line" on the gums, metallic taste, loss of appetite, insomnia, dizziness and other symptoms similar to that of inhalation. Acute poisoning may result in high lead levels in the blood and urine, shock, coma and death in extreme cases. Lead metal foil, shot or sheets: Not an ingestion hazard for usual industrial handling.

## 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:** 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:**

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: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Lead California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Lead California prop. 65 (no significant risk level): Lead: 0.0005 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: Lead 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: Lead Connecticut hazardous material survey.: Lead Illinois toxic substances disclosure to employee act: Lead Illinois chemical safety act: Lead New York release reporting list: Lead Rhode Island RTK hazardous substances: Lead Pennsylvania RTK: Lead

**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-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):**

R20/22- Harmful by inhalation and if swallowed. R33- Danger of cumulative effects. R61- May cause harm to the unborn child. R62- Possible risk of impaired fertility. S36/37- Wear suitable protective clothing and gloves. S44- If you feel unwell, seek medical advice (show the label when possible). S53- Avoid exposure - obtain special instructions before use.

**HMIS (U.S.A.):**

**Health Hazard:** 1

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** E

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

**Health:** 1

**Flammability:** 0

**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. Safety glasses.

## Section 16: Other Information

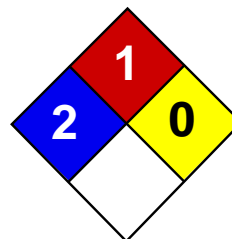
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:21 PM

**Last Updated:** 05/21/2013 12:00 PM

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Health	2
Fire	1
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### 1,1,1-Trichloroethane MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** 1,1,1-Trichloroethane

**Catalog Codes:**

**CAS#:** 71-55-6

**RTECS:** KJ2975000

**TSCA:** TSCA 8(b) inventory: 1,1,1-Trichloroethane

**CI#:** Not available.

**Synonym:**

**Chemical Formula:** CH<sub>3</sub>CCl<sub>3</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
{1,1,1-}Trichloroethane	71-55-6	100

**Toxicological Data on Ingredients:** 1,1,1-Trichloroethane: ORAL (LD<sub>50</sub>): Acute: 9600 mg/kg [Rat]. 6000 mg/kg [Mouse]. DERMAL (LD<sub>50</sub>): Acute: 15800 mg/kg [Rabbit]. VAPOR (LC<sub>50</sub>): Acute: 18000 ppm 4 hour(s) [Rat].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

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

##### Potential Chronic Health Effects:

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, liver, 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 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:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 537°C (998.6°F)

**Flash Points:** Not available.

**Flammable Limits:** LOWER: 7.5% UPPER: 12.5%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>), halogenated compounds.

**Fire Hazards in Presence of Various Substances:** Slightly flammable to flammable in presence of oxidizing materials, of acids, of alkalis.

**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 to explosive in presence of oxidizing materials, of acids, of alkalis.

**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:** 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:**

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 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:**

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:**

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: 350 STEL: 440 CEIL: 440 (ppm) from ACGIH (TLV) [1995] TWA: 1900 STEL: 2460 CEIL: 2380 (mg/m<sup>3</sup>) from ACGIH [1995] 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:** 133.41 g/mole

**Color:** Not available.

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

**Boiling Point:** 74.1°C (165.4°F)

**Melting Point:** -32.5°C (-26.5°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.3376 (Water = 1)

**Vapor Pressure:** 100 mm of Hg (@ 20°C)

**Vapor Density:** 4.6 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 400 ppm

**Water/Oil Dist. Coeff.:** The product is equally soluble in oil and water; log(oil/water) = 0

**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:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 6000 mg/kg [Mouse]. Acute dermal toxicity (LD50): 15800 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 18000 ppm 4 hour(s) [Rat].

**Chronic Effects on Humans:** The substance is toxic to lungs, the nervous system, liver, mucous membranes.

**Other Toxic Effects on Humans:**

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

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Detected in maternal milk in human.

**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 6.1: Poisonous material.

**Identification:** : 1,1,1-Trichloroethane : UN2831 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Pennsylvania RTK: 1,1,1-Trichloroethane Massachusetts RTK: 1,1,1-Trichloroethane TSCA 8(b) inventory: 1,1,1-Trichloroethane SARA 313 toxic chemical notification and release reporting: 1,1,1-Trichloroethane CERCLA: Hazardous substances.: 1,1,1-Trichloroethane

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

### Other Classifications:

**WHMIS (Canada):** CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

### DSCL (EEC):

R38- Irritating to skin. R41- Risk of serious damage to eyes.

### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 2

**Flammability:** 1

**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.

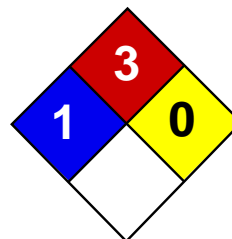
**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:31 PM

**Last Updated:** 05/21/2013 12:00 PM

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Health	1
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Cyclohexane MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Cyclohexane

**Catalog Codes:** SLC3520, SLC2305

**CAS#:** 110-82-7

**RTECS:** GU6300000

**TSCA:** TSCA 8(b) inventory: Cyclohexane

**CI#:** Not applicable.

**Synonym:** Benzene, hexahydro-; Hexahydrobenzene; Hexamethylene; Hexanaphthene

**Chemical Name:** Cyclohexane

**Chemical Formula:** C<sub>6</sub>H<sub>12</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
Cyclohexane	110-82-7	100

**Toxicological Data on Ingredients:** Cyclohexane: ORAL (LD<sub>50</sub>): Acute: 12705 mg/kg [Rat]. 813 mg/kg [Mouse]. DERMAL (LD): Acute: >18000 mg/kg [Rabbit].

#### Section 3: Hazards Identification

**Potential Acute Health Effects:** Slightly hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation.

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to kidneys, liver, cardiovascular system, 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. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. 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 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. Seek medical attention.

**Ingestion:**

If swallowed, do NOT induce vomiting. Do NOT induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Aspiration hazard if swallowed- can enter lungs and cause damage. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention. Get medical attention if symptoms appear.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 245°C (473°F)

**Flash Points:** CLOSED CUP: -18°C (-0.4°F). (Setaflash)

**Flammable Limits:** LOWER: 1.3% UPPER: 8.4%

**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.

**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.

**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:** Vapor may travel considerable distance to source of ignition and flash back.

**Special Remarks on Explosion Hazards:** When mixed hot with liquid dinitrogen tetroxide an explosion can result.

## 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, insoluble 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: 300 (ppm) from ACGIH (TLV) [United States] TWA: 300 (ppm) from OSHA (PEL) [United States] TWA: 1050 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] TWA: 100 STEL: 300 (ppm) [United Kingdom (UK)] TWA: 350 STEL: 1050 (mg/m<sup>3</sup>) [United Kingdom (UK)] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:**

Chloroform-like odor; solvent odor; mild sweet odor

**Taste:** Not available.

**Molecular Weight:** 84.16 g/mole

**Color:** Clear Colorless.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 80.7°C (177.3°F)

**Melting Point:** 6.47°C (43.6°F)

**Critical Temperature:** 280.4°C (536.7°F)

**Specific Gravity:** 0.7781 (Water = 1)

**Vapor Pressure:** 12.9 kPa (@ 20°C)

**Vapor Density:** 2.98 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 25 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil; log(oil/water) = 3.4

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, methanol.

**Solubility:**

Soluble in methanol. Insoluble in cold water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, ignition sources, incompatible materials

**Incompatibility with various substances:** Reactive with oxidizing agents.

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

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 813 mg/kg [Mouse].

**Chronic Effects on Humans:** May cause damage to the following organs: kidneys, liver, cardiovascular system, central nervous system (CNS).

**Other Toxic Effects on Humans:** Slightly hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:**

Lowest Published Lethal Dose: LCL[Mouse] - Route: Inhalation; Dose: 70000 mg/m<sup>3</sup>/2H LCL[Rabbit] - 89600 mg/m<sup>3</sup>/1H

**Special Remarks on Chronic Effects on Humans:**

Human: passes the placental barrier, detected in maternal milk. May affect genetic material (mutagenic)

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: It may cause skin irritation. It may be absorbed through the skin. Eyes: It may cause eye irritation. Inhalation: It may cause respiratory tract (nose, throat) irritation. Exposure to high concentrations of vapor may cause nausea, increased respiration rate. It may also affect behavior/central nervous system(dizziness, lethargy, somnolence, lightheadedness, seizures/convulsions, weakness, loss of coordination and judgement, trembling, drowsiness). Unconsciousness and death may occur at high exposures. In experimental animals there is a narrow margin between doses causing narcosis, loss of reflexes and death. Generalized vascular damage/collapse and degenerative changes were seen in the heart, lung, liver kidneys and brain of experimental animals exposed to lethal concentrations by inhalation or ingestion. Ingestion: May cause gastrointestinal irritation and diarrhea. May affect behavior/central nervous system with symptoms similar that that of inhalation. May cause liver and kidney damage. Aspiration of cyclohexane into the lungs may cause chemical pneumonitis. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may cause drying, cracking and chapping of exposed areas. Ingestion and Ingestion: Prolonged or repeated inhalation or ingestion may causeliver and kidney damage. It may also affect behavior/central nevous system with sytoms similar to that of acute ingestion or inhalation.

## 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 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 3: Flammable liquid.

**Identification:** : Cyclohexane UNNA: 1145 PG: II

**Special Provisions for Transport:** Not available.

### Section 15: Other Regulatory Information

**Federal and State Regulations:**

Connecticut hazardous material survey.: Cyclohexane Illinois toxic substances disclosure to employee act: Cyclohexane Illinois chemical safety act: Cyclohexane New York release reporting list: Cyclohexane Rhode Island RTK hazardous substances: Cyclohexane Pennsylvania RTK: Cyclohexane Minnesota: Cyclohexane Massachusetts RTK: Cyclohexane Massachusetts spill list: Cyclohexane New Jersey: Cyclohexane New Jersey spill list: Cyclohexane Louisiana spill reporting: Cyclohexane TSCA 8(b) inventory: Cyclohexane SARA 313 toxic chemical notification and release reporting: Cyclohexane CERCLA: Hazardous substances.: Cyclohexane: 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).

**DSCL (EEC):**

**HMIS (U.S.A.):**

**Health Hazard:** 1

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 1

**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 08:17 PM

**Last Updated:** 05/21/2013 12:00 PM

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## Material Safety Data Sheet

Version 4.2

Revision Date 11/30/2012

Print Date 05/30/2014

## 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Dibromochloromethane

Product Number : 206326

Brand : Aldrich

Supplier : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

Preparation Information : Sigma-Aldrich Corporation  
Product Safety - Americas Region  
1-800-521-8956

## 2. HAZARDS IDENTIFICATION

## Emergency Overview

## OSHA Hazards

Toxic by ingestion

## GHS Classification

Acute toxicity, Oral (Category 4)

## GHS Label elements, including precautionary statements

Pictogram



Signal word : Warning

Hazard statement(s)

H302 : Harmful if swallowed.

Precautionary statement(s) : none

## HMIS Classification

Health hazard: 2

Flammability: 0

Physical hazards: 0

## NFPA Rating

Health hazard: 2

Fire: 0

Reactivity Hazard: 0

## Potential Health Effects

**Inhalation** : May be harmful if inhaled. May cause respiratory tract irritation.

**Skin** : May be harmful if absorbed through skin. May cause skin irritation.

**Eyes** : May cause eye irritation.

**Ingestion** : Toxic if swallowed.

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Chlorodibromomethane

Formula :  $\text{CHBr}_2\text{Cl}$

Molecular Weight : 208.28 g/mol

Component		Concentration
<b>Dibromochloromethane</b>		
CAS-No.	124-48-1	-
EC-No.	204-704-0	

---

### 4. FIRST AID MEASURES

#### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

---

### 5. FIREFIGHTING MEASURES

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

#### Special protective equipment for firefighters

Wear self contained breathing apparatus for fire fighting if necessary.

#### Hazardous combustion products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas, Hydrogen bromide gas

---

### 6. ACCIDENTAL RELEASE MEASURES

#### Personal precautions

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

#### Environmental precautions

Do not let product enter drains.

#### Methods and materials for containment and cleaning up

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

---

### 7. HANDLING AND STORAGE

#### Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Normal measures for preventive fire protection.

#### Conditions for safe storage

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature: 2 - 8 °C



## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

### Personal protective equipment

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Hand protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Eye protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin and body protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	liquid, clear
Colour	light yellow

### Safety data

pH	no data available
Melting point/freezing point	Melting point/range: -22 °C (-8 °F) - lit.
Boiling point	119 - 120 °C (246 - 248 °F) at 997 hPa (748 mmHg) - lit.
Flash point	no data available
Ignition temperature	no data available
Auto-ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	2.451 g/cm <sup>3</sup> at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapor density	no data available
Odour	no data available
Odour Threshold	no data available

Evaporation rate      no data available

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## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong bases, Strong oxidizing agents, Magnesium

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas, Hydrogen bromide gas

Other decomposition products - no data available

---

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 370.0 mg/kg

Remarks: Peripheral Nerve and Sensation: Flaccid paralysis without anesthesia (usually neuromuscular blockage). Behavioral: Somnolence (general depressed activity). Behavioral: Tremor.

#### Inhalation LC50

no data available

#### Dermal LD50

no data available

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

no data available

### Germ cell mutagenicity

no data available

### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

### **Reproductive toxicity**

no data available

### **Teratogenicity**

no data available

### **Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

### **Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

### **Aspiration hazard**

no data available

### **Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	Toxic if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

### **Signs and Symptoms of Exposure**

prolonged or repeated exposure can cause: Nausea, Dizziness, Headache, narcosis

### **Synergistic effects**

no data available

### **Additional Information**

RTECS: PA6360000

---

## **12. ECOLOGICAL INFORMATION**

### **Toxicity**

Toxicity to fish LC50 - Cyprinus carpio (Carp) - 34 mg/l - 5 d

### **Persistence and degradability**

no data available

### **Bioaccumulative potential**

no data available

### **Mobility in soil**

no data available

### **PBT and vPvB assessment**

no data available

### **Other adverse effects**

no data available

---

## **13. DISPOSAL CONSIDERATIONS**

### **Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION****DOT (US)**

UN number: 3082 Class: 9

Packing group: III

Proper shipping name: Environmentally hazardous substances, liquid, n.o.s. (Dibromochloromethane)

Reportable Quantity (RQ): 100 lbs

Marine Pollutant: No

Poison Inhalation Hazard: No

**IMDG**

Not dangerous goods

**IATA**

Not dangerous goods

---

**15. REGULATORY INFORMATION****OSHA Hazards**

Toxic by ingestion

**SARA 302 Components**

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**

Acute Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
Dibromochloromethane	124-48-1	2007-03-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
Dibromochloromethane	124-48-1	2007-03-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
Dibromochloromethane	124-48-1	2007-03-01

**California Prop. 65 Components**

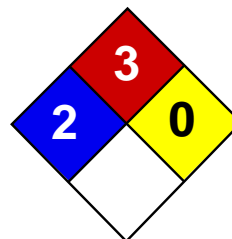
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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**16. OTHER INFORMATION****Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://www.sigma-aldrich.com) and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.



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:** 05/21/2013 12:00 PM

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# Material Safety Data Sheet



Halocarbon R-113 (1,1,2-Trichlorotrifluoroethane)

## Section 1. Chemical product and company identification

<b>Product name</b>	: Halocarbon R-113 (1,1,2-Trichlorotrifluoroethane)
<b>Supplier</b>	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
<b>Product use</b>	: Synthetic/Analytical chemistry.
<b>Synonym</b>	: Ethane, 1,1,2-trichloro-1,2,2-trifluoro-; 1,1,2-Trichloro-1,2,2-trifluoroethane; 1,2,2-Trichlorotrifluoroethane; Algofrene 113; TTE; Refrigerant 113; Halocarbon 113; Genetron 113; Freon 113; CFC-113
<b>MSDS #</b>	: 001098
<b>Date of Preparation/ Revision</b>	: 3/5/2014.
<b>In case of emergency</b>	: 1-866-734-3438

## Section 2. Hazards identification

<b>Physical state</b>	: Liquid. [COLORLESS TO WATER-WHITE LIQUID WITH AN ODOR LIKE CARBON TETRACHLORIDE (AT HIGH CONCENTRATIONS) [NOTE: A GAS ABOVE 118 F.]]
<b>Emergency overview</b>	: CAUTION! MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. Contact with rapidly expanding gases can cause frostbite.
<b>Target organs</b>	: May cause damage to the following organs: heart, cardiovascular system, skin, central nervous system (CNS).
<b>Routes of entry</b>	: Inhalation
<b>Potential acute health effects</b>	
<b>Eyes</b>	: No known significant effects or critical hazards.
<b>Skin</b>	: Irritating to skin.
<b>Inhalation</b>	: Acts as a simple asphyxiant.
<b>Ingestion</b>	: Ingestion is not a normal route of exposure for gases
<b>Potential chronic health effects</b>	
<b>Target organs</b>	: May cause damage to the following organs: heart, cardiovascular system, skin, central nervous system (CNS).
<b>Medical conditions aggravated by over-exposure</b>	: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

## Section 3. Composition, Information on Ingredients

<b>Name</b>	<b>CAS number</b>	<b>% Volume</b>	<b>Exposure limits</b>
Halocarbon 113 (1,1,2-Trichlorotrifluoroethane)	76-13-1	100	<b>ACGIH TLV (United States, 3/2012).</b> TWA: 1000 ppm 8 hours. TWA: 7670 mg/m <sup>3</sup> 8 hours. STEL: 1250 ppm 15 minutes. STEL: 9590 mg/m <sup>3</sup> 15 minutes. <b>OSHA PEL 1989 (United States, 3/1989).</b> TWA: 1000 ppm 8 hours. TWA: 7600 mg/m <sup>3</sup> 8 hours.

STEL: 1250 ppm 15 minutes.  
STEL: 9500 mg/m<sup>3</sup> 15 minutes.  
**NIOSH REL (United States, 1/2013).**  
TWA: 1000 ppm 10 hours.  
TWA: 7600 mg/m<sup>3</sup> 10 hours.  
STEL: 1250 ppm 15 minutes.  
STEL: 9500 mg/m<sup>3</sup> 15 minutes.  
**OSHA PEL (United States, 6/2010).**  
TWA: 1000 ppm 8 hours.  
TWA: 7600 mg/m<sup>3</sup> 8 hours.

## Section 4. First aid measures

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

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

## Section 5. Fire-fighting measures

- Flammability of the product** : Non-flammable.
- Products of combustion** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide  
halogenated compounds  
carbonyl halides
- Fire-fighting media and instructions** : Use an extinguishing agent suitable for the surrounding fire.
- In a fire or if heated, a pressure increase will occur and the container may burst.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

- Personal precautions** : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
- Methods for cleaning up** : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

## Section 7. Handling and storage

- Handling** : Wash thoroughly after handling.
- Storage** : Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8. Exposure controls/personal protection

- Engineering controls** : No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.
- Personal protection**
- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

### Product name

1,1,2-trichlorotrifluoroethane

### ACGIH TLV (United States, 3/2012).

TWA: 1000 ppm 8 hours.  
TWA: 7670 mg/m<sup>3</sup> 8 hours.  
STEL: 1250 ppm 15 minutes.  
STEL: 9590 mg/m<sup>3</sup> 15 minutes.

### OSHA PEL 1989 (United States, 3/1989).

TWA: 1000 ppm 8 hours.  
TWA: 7600 mg/m<sup>3</sup> 8 hours.  
STEL: 1250 ppm 15 minutes.  
STEL: 9500 mg/m<sup>3</sup> 15 minutes.

### NIOSH REL (United States, 1/2013).

TWA: 1000 ppm 10 hours.  
TWA: 7600 mg/m<sup>3</sup> 10 hours.  
STEL: 1250 ppm 15 minutes.  
STEL: 9500 mg/m<sup>3</sup> 15 minutes.

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

TWA: 1000 ppm 8 hours.  
TWA: 7600 mg/m<sup>3</sup> 8 hours.

Consult local authorities for acceptable exposure limits.

## Section 9. Physical and chemical properties

- Molecular weight** : 187.37 g/mole
- Molecular formula** : C<sub>2</sub>Cl<sub>3</sub>F<sub>3</sub>
- Boiling/condensation point** : 47.7°C (117.9°F)
- Melting/freezing point** : -35°C (-31°F)
- Critical temperature** : 214.1°C (417.4°F)
- Vapor pressure** : @ 70°F (21.1°C) = 5.6 psia (38.6 kPa)

## Halocarbon R-113 (1,1,2-Trichlorotrifluoroethane)

Vapor density	: 6.5 (Air = 1)
Specific Volume (ft <sup>3</sup> /lb)	: 0.6349
Gas Density (lb/ft <sup>3</sup> )	: 1.575

## Section 10. Stability and reactivity

Stability and reactivity	: The product is stable.
Incompatibility with various substances	: Highly reactive or incompatible with the following materials: metals.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
1,1,2-trichlorotrifluoroethane	LD Dermal	Rabbit	>11 g/kg	-
	LD50 Oral	Rat	43 g/kg	-
	LC50 Inhalation Gas.	Rat	155540 ppm	1 hours
	LC50 Inhalation Gas.	Rat	38500 ppm	4 hours
	LC50 Inhalation Gas.	Rat	38000 ppm	4 hours

IDLH : 2000 ppm

Chronic effects on humans : **CARCINOGENIC EFFECTS:** A4 (Not classifiable for humans or animals.) by ACGIH. May cause damage to the following organs: heart, cardiovascular system, skin, central nervous system (CNS).

Other toxic effects on humans : No specific information is available in our database regarding the other toxic effects of this material to humans.

### Specific effects

Carcinogenic effects	: No known significant effects or critical hazards.
Mutagenic effects	: No known significant effects or critical hazards.
Reproduction toxicity	: No known significant effects or critical hazards.

## Section 12. Ecological information

### Aquatic ecotoxicity

Not available.

Environmental fate : Not available.




Environmental hazards : No known significant effects or critical hazards.

Toxicity to the environment : Not available.

## Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

## Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
<b>DOT Classification</b>	UN3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (1,1, 2-trichlorotrifluoroethane)	9	Not applicable (gas).		-
<b>TDG Classification</b>	UN3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (1,1, 2-trichlorotrifluoroethane)	9	Not applicable (gas).		<b><u>Explosive Limit and Limited Quantity Index</u></b> 5
<b>Mexico Classification</b>	UN3082	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (1,1, 2-trichlorotrifluoroethane)	9	Not applicable (gas).		-

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

## Section 15. Regulatory information

### United States

**U.S. Federal regulations** : TSCA 6 final risk management: 1,1,2-trichlorotrifluoroethane  
**United States inventory (TSCA 8b)**: This material is listed or exempted.  
TSCA 12(b) annual export notification: 1,1,2-trichlorotrifluoroethane  
**SARA 302/304/311/312 extremely hazardous substances**: No products were found.  
**SARA 302/304 emergency planning and notification**: No products were found.  
**SARA 302/304/311/312 hazardous chemicals**: 1,1,2-trichlorotrifluoroethane  
**SARA 311/312 MSDS distribution - chemical inventory - hazard identification**: 1,1, 2-trichlorotrifluoroethane: Immediate (acute) health hazard, Delayed (chronic) health hazard

### SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
<b>Form R - Reporting requirements</b>	: Halocarbon 113 (1,1,2-Trichlorotrifluoroethane)	76-13-1	100
<b>Supplier notification</b>	: Halocarbon 113 (1,1,2-Trichlorotrifluoroethane)	76-13-1	100

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

### State regulations

: **Connecticut Carcinogen Reporting**: This material is not listed.  
**Connecticut Hazardous Material Survey**: This material is not listed.  
**Florida substances**: This material is not listed.  
**Illinois Chemical Safety Act**: This material is not listed.  
**Illinois Toxic Substances Disclosure to Employee Act**: This material is not listed.  
**Louisiana Reporting**: This material is not listed.  
**Louisiana Spill**: This material is not listed.  
**Massachusetts Spill**: This material is not listed.  
**Massachusetts Substances**: This material is listed.  
**Michigan Critical Material**: This material is not listed.  
**Minnesota Hazardous Substances**: This material is not listed.  
**New Jersey Hazardous Substances**: This material is listed.  
**New Jersey Spill**: This material is not listed.

Halocarbon R-113 (1,1,2-Trichlorotrifluoroethane)

**New Jersey Toxic Catastrophe Prevention Act:** This material is not listed.  
**New York Acutely Hazardous Substances:** This material is listed.  
**New York Toxic Chemical Release Reporting:** This material is not listed.  
**Pennsylvania RTK Hazardous Substances:** This material is listed.  
**Rhode Island Hazardous Substances:** This material is not listed.

Canada

**WHMIS (Canada)** : Not controlled under WHMIS (Canada).  
**CEPA Toxic substances:** This material is listed.  
**Canadian ARET:** This material is not listed.  
**Canadian NPRI:** This material is listed.  
**Alberta Designated Substances:** This material is not listed.  
**Ontario Designated Substances:** This material is not listed.  
**Quebec Designated Substances:** This material is not listed.

Section 16. Other information

United States

**Label requirements** : MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

Canada

**Label requirements** : Not controlled under WHMIS (Canada).

**Hazardous Material Information System (U.S.A.)** :

Health	* 1
Flammability	0
Physical hazards	0

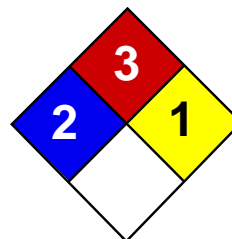
**National Fire Protection Association (U.S.A.)** :



Notice to reader

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





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

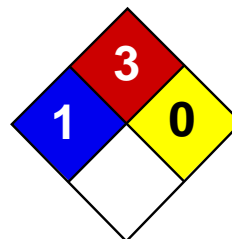
**References:** Not available.

**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	1
Fire	3
Reactivity	2
Personal Protection	H

## Material Safety Data Sheet

### Methyl acetate MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Methyl acetate

**Catalog Codes:** SLM3556, SLM1411

**CAS#:** 79-20-9

**RTECS:** AI9100000

**TSCA:** TSCA 8(b) inventory: Methyl acetate

**CI#:** Not applicable.

**Synonym:** Tereton

**Chemical Name:** Methyl acetate

**Chemical Formula:** CH<sub>3</sub>COOCH<sub>3</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
Methyl acetate	79-20-9	100

**Toxicological Data on Ingredients:** Methyl acetate: ORAL (LD50): Acute: 5001 mg/kg [Rat]. DERMAL (LD50): Acute: 5001 mg/kg [Rabbit].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

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

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs. 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. 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:** 501.67°C (935°F)

**Flash Points:** CLOSED CUP: -10°C (14°F). OPEN CUP: -5.56°C (22°F) (Cleveland).

**Flammable Limits:** LOWER: 3.1% UPPER: 16%

**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, of oxidizing materials.

**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:**

May explode when heated. Vapor may travel considerable distance to source of ignition and flash back. When heated to decomposition it emits acrid smoke and fumes.

**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. 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. Keep away from incompatibles such as oxidizing agents, acids, alkalis, moisture.

### 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: 200 CEIL: 250 (ppm) from ACGIH (TLV) TWA: 610 CEIL: 760 (mg/m<sup>3</sup>) from ACGIH Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid. (Liquid.)

**Odor:** Fragrance like.

**Taste:** Not available.

**Molecular Weight:** 74.08 g/mole

**Color:** Colorless.

**pH (1% soln/water):** 7 [Neutral.]

**Boiling Point:** 57°C (134.6°F)

**Melting Point:** -98.05°C (-144.5°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 0.92 (Water = 1)

**Vapor Pressure:** 173 mm of Hg (@ 20°C)

**Vapor Density:** 2.8 (Air = 1)

**Volatility:** Not available.



**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:**

Easily soluble in methanol, diethyl ether. 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:** Reactive with oxidizing agents, acids, alkalis, moisture.

**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): 5001 mg/kg [Rat]. Acute dermal toxicity (LD50): 5001 mg/kg [Rabbit].

**Chronic Effects on Humans:** The substance is toxic to lungs.

**Other Toxic Effects on Humans:**

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

**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:**

Exposure can cause nausea, headache and vomiting. Material is irritating to mucous membranes and upper respiratory tract.

## 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 acetate : UN1231 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Pennsylvania RTK: Methyl acetate Massachusetts RTK: Methyl acetate TSCA 8(b) inventory: Methyl acetate

**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:** 1

**Fire Hazard:** 3

**Reactivity:** 2

**Personal Protection:** h

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

**Health:** 1

**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:

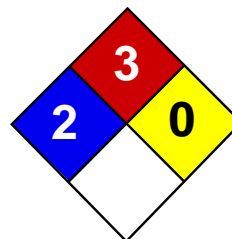
-Guide de la loi et du r glement sur le transport des marchandises dangereuses au Canada. Centre de conformit  international Lt e. 1986. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -Material safety data sheet emitted by: la Commission de la Sant  et de la S curit  du Travail du Qu bec. -SAX, N.I. Dangerous Properties of Industrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II.

**Other Special Considerations:** Not available.

**Created:** 10/11/2005 12:20 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 (LD50): Acute: 4000 mg/kg [Rat]. 5960 mg/kg [Mouse]. VAPOR (LC50): Acute: 23576 ppm 4 hour(s) [Rat].

#### Section 3: Hazards Identification

**Potential Acute Health Effects:**

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

**Potential Chronic Health Effects:**

Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

#### Section 4: First Aid Measures

**Eye Contact:**

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

**Skin Contact:**

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

**Serious Skin Contact:**

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

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

**Serious Inhalation:**

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

**Ingestion:**

Do not induce vomiting. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

**Serious Ingestion:** Not available.

## Section 5: Fire and Explosion Data

**Flammability of the Product:** Flammable.

**Auto-Ignition Temperature:** 224°C (435.2°F)

**Flash Points:** CLOSED CUP: -28°C (-18.4°F).

**Flammable Limits:** LOWER: 2.5% UPPER: 15.1%

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

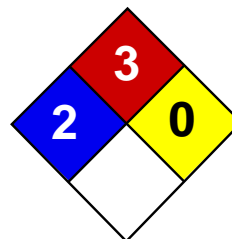
**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:23 PM

**Last Updated:** 05/21/2013 12:00 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	G

## Material Safety Data Sheet

### Methylcyclohexane MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Methylcyclohexane

**Catalog Codes:** SLM4315

**CAS#:** 108-87-2

**RTECS:** GV6125000

**TSCA:** TSCA 8(b) inventory: Methylcyclohexane

**CI#:** Not available.

**Synonym:**

**Chemical Formula:** C<sub>7</sub>H<sub>14</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
Methylcyclohexane	108-87-2	100

**Toxicological Data on Ingredients:** Methylcyclohexane: ORAL (LD<sub>50</sub>): Acute: 2250 mg/kg [Mouse]. VAPOR (LC<sub>50</sub>): Acute: 20750 ppm 4 hour(s) [Mouse]. 7613.5 ppm 4 hour(s) [Rabbit].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

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

##### Potential Chronic Health Effects:

Hazardous in case of skin contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of eye contact (irritant).  
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. Repeated or prolonged exposure to the substance can produce target organs damage.

#### Section 4: First Aid Measures

**Eye Contact:** No known effect on eye contact, rinse with water for a few minutes.

**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 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:** 250°C (482°F)

**Flash Points:** CLOSED CUP: 0.38°C (32.7°F). (Setaflash) OPEN CUP: -4°C (24.8°F).

**Flammable Limits:** LOWER: 1.2% UPPER: 6.7%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>).

**Fire Hazards in Presence of Various Substances:** Slightly flammable to flammable in presence of oxidizing materials.

**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 to explosive in presence of oxidizing materials.

**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:** 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, insoluble 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. 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 away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/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.

**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:**

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: 400 CEIL: 500 (ppm) from ACGIH (TLV) TWA: 1600 CEIL: 2000 (mg/m3) from ACGIH 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:** 98.19 g/mole

**Color:** Clear Colorless.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 100.9°C (213.6°F)

**Melting Point:** -126°C (-194.8°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 0.7694 (Water = 1)

**Vapor Pressure:** 37 mm of Hg (@ 20°C)

**Vapor Density:** 3.39 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 498 ppm

**Water/Oil Dist. Coeff.:** The product is equally soluble in oil and water; log(oil/water) = 0

**Ionicity (in Water):** Not available.

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

**Solubility:**

Soluble in methanol, diethyl ether, acetone. Insoluble 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:** Inhalation. Ingestion.

**Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2250 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 7613.5 ppm 4 hour(s) [Rabbit].

**Chronic Effects on Humans:** The substance is toxic to lungs, the nervous system.

**Other Toxic Effects on Humans:** Hazardous in case of skin contact (irritant), 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:** : Methylcyclohexane : UN2296 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Pennsylvania RTK: Methylcyclohexane Massachusetts RTK: Methylcyclohexane TSCA 8(b) inventory: Methylcyclohexane

**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).

### DSCL (EEC):

R11- Highly flammable. R38- Irritating to skin.

### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** g

### 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. Safety glasses.

## Section 16: Other Information

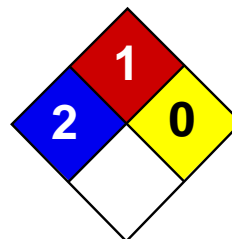
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 06:08 PM

**Last Updated:** 05/21/2013 12:00 PM

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Health	2
Fire	1
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Methylene chloride MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Methylene chloride

**Catalog Codes:** SLM2398, SLM3772, SLM1297, SLM2677, SLM4054

**CAS#:** 75-09-2

**RTECS:** PA8050000

**TSCA:** TSCA 8(b) inventory: Methylene chloride

**CI#:** Not available.

**Synonym:** Dichloromethane

**Chemical Name:** Methylene Chloride

**Chemical Formula:** C-H<sub>2</sub>-Cl<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
Methylene chloride	75-09-2	100

**Toxicological Data on Ingredients:** Methylene chloride: ORAL (LD50): Acute: 1600 mg/kg [Rat].

#### Section 3: Hazards Identification

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

**Potential Chronic Health Effects:** CARCINOGENIC EFFECTS: Classified + (Proven.) by OSHA. Classified 2B (Possible for human.) by IARC. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, liver, mucous membranes, 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. 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. Cold water may be used. 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:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 556°C (1032.8°F)

**Flash Points:** Not available.

**Flammable Limits:** LOWER: 12% UPPER: 19%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>), halogenated compounds.

**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:** Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

**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:** Keep locked up.. 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 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.

**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. Ensure that eyewash stations and safety showers are proximal to the workstation 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 from ACGIH (TLV) [United States] TWA: 174 from ACGIH (TLV) [United States] 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:** 84.93g/mole

**Color:** Not available.

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

**Boiling Point:** 39.75°C (103.5°F)

**Melting Point:** -96.7°C (-142.1°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.3266 (Water = 1)

**Vapor Pressure:** 46.5 kPa (@ 20°C)

**Vapor Density:** 2.93 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 214 ppm

**Water/Oil Dist. Coeff.:** The product is equally soluble in oil and water;  $\log(\text{oil/water}) = 0.1$

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, methanol, diethyl ether, n-octanol, acetone.

**Solubility:** Easily soluble in methanol, diethyl ether, n-octanol, acetone. 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:** 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): 1600 mg/kg [Rat]. Acute toxicity of the vapor (LC50): 52000 1 hours [Rat].

**Chronic Effects on Humans:** CARCINOGENIC EFFECTS: Classified + (Proven.) by OSHA. Classified 2B (Possible for human.) by IARC. Causes damage to the following organs: lungs, the nervous system, liver, mucous membranes, central nervous system (CNS).

**Other Toxic Effects on Humans:** Very hazardous in case of ingestion, of inhalation. Hazardous in case of skin contact (irritant, permeator).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Human: passes through the placenta, excreted in maternal milk.

**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 6.1: Poisonous material.

**Identification:** : Dichloromethane UNNA: 1593 PG: III

**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: Methylene chloride 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: Methylene chloride Pennsylvania

RTK: Methylene chloride Massachusetts RTK: Methylene chloride TSCA 8(b) inventory: Methylene chloride SARA 313 toxic chemical notification and release reporting: Methylene chloride CERCLA: Hazardous substances.: Methylene chloride

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

**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):** R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 2

**Flammability:** 1

**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

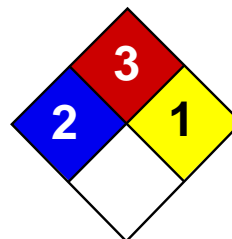
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 10:43 AM

**Last Updated:** 05/21/2013 12:00 PM

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Health	2
Fire	3
Reactivity	1
Personal Protection	J

## Material Safety Data Sheet

### p-Dioxane MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** p-Dioxane

**Catalog Codes:** SLD3919

**CAS#:** 123-91-1

**RTECS:** JG8225000

**TSCA:** TSCA 8(b) inventory: 1,4-Dioxane

**CI#:** Not applicable.

**Synonym:** p-Dioxane; Diethylene dioxide; 1,4-Dioxane

**Chemical Name:** 1,4-Dioxacyclohexane

**Chemical Formula:** C<sub>4</sub>H<sub>8</sub>O<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
{1,4-}Dioxane	123-91-1	100

**Toxicological Data on Ingredients:** 1,4-Dioxane: ORAL (LD50): Acute: 4200 mg/kg [Rat.]. 5300 mg/kg [Mouse]. 2000 mg/kg [Rabbit]. VAPOR (LC50): Acute: 37000 mg/m<sup>3</sup> 2 hours [Mouse].

#### 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:

Hazardous in case of inhalation. CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, 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. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may 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. Cold water may be used.

**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 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:** 180°C (356°F)

**Flash Points:** CLOSED CUP: 12°C (53.6°F). OPEN CUP: 18.3°C (64.9°F) (Cleveland).

**Flammable Limits:** LOWER: 2% UPPER: 22%

**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. 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:**

Vapor is heavier than air and may travel considerable distance to source of ignition and flash back. When heated to decomposition, it emits acrid smoke and irritating fumes.

**Special Remarks on Explosion Hazards:**

Vapor forms explosive mixtures with air over a wide range. Dioxane is capable of forming explosive peroxides under certain conditions, and unless proper precautions are taken, it can explode when redistilled. In the reaction with triethynylaluminum, the residue from the sublimation of the complex with Dioxane is explosive. The complex should not be dried by heating.

## 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. 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. 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).

**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 (impervious).

**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: 72 (mg/m<sup>3</sup>) from ACGIH (TLV) [United States] TWA: 20 (ppm) from ACGIH (TLV) [United States] CEIL: 3.6 (mg/m<sup>3</sup>) from NIOSH CEIL: 1 (ppm) from NIOSH TWA: 25 (ppm) from OSHA (PEL) [United States] TWA: 90 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] TWA: 25 STEL: 100 (ppm) [United Kingdom (UK)] TWA: 91 STEL: 366 (mg/m<sup>3</sup>) [United Kingdom (UK)] CEIL: 100 (ppm) from OSHA (PEL) [United States] CEIL: 360 (mg/m<sup>3</sup>) from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

**Section 9: Physical and Chemical Properties**

**Physical state and appearance:** Liquid. (Liquid.)

**Odor:** Ethereal. Pleasant. (Slight.)

**Taste:** Not available.

**Molecular Weight:** 88.11 g/mole

**Color:** Colorless.

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

**Boiling Point:** 101.1°C (214°F)

**Melting Point:** 11.8°C (53.2°F)

**Critical Temperature:** 312°C (593.6°F)

**Specific Gravity:** 1.0337 (Water = 1)

**Vapor Pressure:** 3.9 kPa (@ 20°C)

**Vapor Density:** 3.03 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** The product is more soluble in water; log(oil/water) = -0.3

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water.

**Solubility:** Soluble in cold water, hot water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, ignition sources, incompatible materials, air, sunlight.

**Incompatibility with various substances:** Reactive with oxidizing agents.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Hydroperoxide-free Dioxane rapidly forms hydroperoxide on contact with air. Exposure to sunlight accelerates this formation. Decomposes to carbon monoxide. Incompatible with silver perchlorate, oxidizing agents, sulfur trioxide, decaborane, triethynyl aluminum, boron trifluoride. Dioxane may react with hydrogen in the presence of Rainey nickel above 210C (410F).

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. 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): 2000 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 37000 mg/m3 2 hours [Mouse].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. May cause damage to the following organs: blood, kidneys, liver, skin, 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:**

LD50 [Rabbit] - Route: Skin; Dose: 7600 ul/kg LCL [Human] - Route: Inhalation; Dose: 470 ppm/72 hrs.

**Special Remarks on Chronic Effects on Humans:**

May cause adverse reproductive effects (fetotoxicity) based on animal data. May affect genetic material (mutagenic) based on animal data. May cause cancer (tumorigenic).

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: Causes skin irritation. May be absorbed through skin with possible system effects. Eyes: Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage. Inhalation: Highly toxic by inhalation. Easily absorbed through lungs. Causes irritation of the respiratory tract. May affect respiration (coughing),

behavior and brain (headache, dizziness, narcosis, irritability, drowsiness, altered sleep time, psychophysical changes), cardiovascular system (increased blood pressure), sense organs, gastrointestinal tract (nausea, vomiting), liver, and kidneys. metabolism Ingestion: Causes gastrointestinal (digestive) tract irritation with nausea, vomiting, sore throat, abdominal pain. May also affect behavior, sense organs, urinary system. Chronic Potential Health Effects: Prolonged exposure may cause central nervous system depression, loss of appetite, nausea, abdominal tenderness, and liver or kidney damage. Prolonged skin contact may cause dermatitis. Suspected human carcinogen based on animal data.

## 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 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 3: Flammable liquid.

**Identification:** : Dioxane UNNA: 1165 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: 1,4-Dioxane California prop. 65 (no significant risk level): 1,4-Dioxane 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: 1,4-Dioxane Connecticut hazardous material survey.: 1,4-Dioxane Illinois toxic substances disclosure to employee act: 1,4-Dioxane Illinois chemical safety act: 1,4-Dioxane New York release reporting list: 1,4-Dioxane Rhode Island RTK hazardous substances: 1,4-Dioxane Pennsylvania RTK: 1,4-Dioxane Minnesota: 1,4-Dioxane Massachusetts RTK: 1,4-Dioxane Massachusetts spill list: 1,4-Dioxane New Jersey: 1,4-Dioxane New Jersey spill list: 1,4-Dioxane Louisiana spill reporting: 1,4-Dioxane California Director's list of Hazardous Substances: 1,4-Dioxane TSCA 8(b) inventory: 1,4-Dioxane SARA 313 toxic chemical notification and release reporting: 1,4-Dioxane CERCLA: Hazardous substances.: 1,4-Dioxane: 100 lbs. (45.36 kg)

**Other Classifications:**

**WHMIS (Canada):**

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

**DSCL (EEC):**

R11- Highly flammable. R36- Irritating to eyes. R45- May cause cancer. S2- Keep out of the reach of children. 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:** 1**Personal Protection:** j**National Fire Protection Association (U.S.A.):****Health:** 2**Flammability:** 3**Reactivity:** 1**Specific hazard:****Protective Equipment:**

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

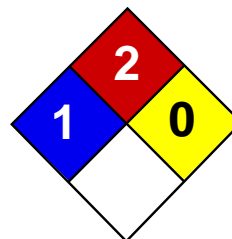
**Section 16: Other Information****References:**

-SAX, N.I. Dangerous Properties of Industrial Materials. Toronto, Van Nostrand Reinold, 6e ed. 1984. -Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. RTECS, and HSDB databases

**Other Special Considerations:** Not available.**Created:** 10/09/2005 05:14 PM**Last Updated:** 05/21/2013 12:00 PM

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Health	2
Fire	2
Reactivity	0
Personal Protection	J

## Material Safety Data Sheet

### p-Cymene MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** p-Cymene

**Catalog Codes:** SLC4330

**CAS#:** 99-87-6

**RTECS:** GZ5950000

**TSCA:** TSCA 8(b) inventory: p-Cymene

**CI#:** Not available.

**Synonym:** 1-Methyl-4-isopropylbenzene; 4-Isopropyl-1-methylbenzene; Benzene, 1-isopropyl-4-methyl-; Camphogen; Cumene, p-methyl-; Cymene; Cymol; Dolcymene; p-Isopropylmethylbenzene; p-Isopropyltoluene; p-Methylisopropyl benzene; Paracymene; Paracymol

**Chemical Name:** p-Cymene

**Chemical Formula:** C<sub>10</sub>H<sub>14</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
{p-}Cymene	99-87-6	100

**Toxicological Data on Ingredients:** p-Cymene: ORAL (LD50): Acute: 4750 mg/kg [Rat]. 3669 mg/kg [Rat].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

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

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. 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. 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 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. 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:** 436°C (816.8°F)

**Flash Points:** CLOSED CUP: 47.222°C (117°F).

**Flammable Limits:** LOWER: 0.7% UPPER: 5.6%

**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.

**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. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

**Special Remarks on Fire Hazards:** When heated to decomposition it emits acrid smoke and irritating fumes.

**Special Remarks on Explosion Hazards:** Explosion hazard is slight in the form of vapor.

## 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, insoluble 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.

## 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. 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. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Boots. Gloves. 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:** Sweetish. Aromatic. Pleasant.

**Taste:** Not available.

**Molecular Weight:** 134.22 g/mole

**Color:** Colorless. Clear

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 177.1°C (350.8°F)

**Melting Point:** -68.9 (-92°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 0.861 (Water = 1)

**Vapor Pressure:** Not available.

**Vapor Density:** 4.62 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** The product is more soluble in oil;  $\log(\text{oil/water}) = 4.1$

**Ionicity (in Water):** Not available.

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

**Solubility:**

Soluble in diethyl ether, acetone. Insoluble in cold water. Soluble in alcohol (ethanol), benzene.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, ignition sources, incompatible materials

**Incompatibility with various substances:** Reactive with oxidizing agents.

**Corrosivity:** Not available.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

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

**Toxicity to Animals:** Acute oral toxicity (LD50): 3669 mg/kg [Rat].

**Chronic Effects on Humans:** May cause damage to the following organs: central nervous system (CNS).

**Other Toxic Effects on Humans:**

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

**Special Remarks on Toxicity to Animals:**

Lethal Dose/Conc 50% Kill: LD50 [Mouse] - Route: Inhalation; Dose: 19500 mg/m3

**Special Remarks on Chronic Effects on Humans:** Not available.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: Causes skin irritation. Symptoms can include erythema, dryness and defatting. It can be absorbed through the skin. Eyes: Contact with liquid causes eye irritation. Vapors are not irritating to the eyes. Inhalation: Vapors are not irritating to the throat. Inhalation of a high concentration of vapors may affect behavior/central nervous system and cause drowsiness, central nervous system depression, unconsciousness. Ingestion: Causes nausea, vomiting, hypermotility, diarrhea. May also affect behavior/central nervous system (somnolence, headache). Aspiration into the lungs may cause chemical pneumonitis. Chronic Potential Health Effects: Skin: Prolonged or repeated skin contact may cause defatting of the skin and dermatitis.

## 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 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 3: Flammable liquid.

**Identification:** : Cymene UNNA: 2046 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Pennsylvania RTK: p-Cymene Massachusetts RTK: p-Cymene Massachusetts spill list: p-Cymene TSCA 8(b) inventory: p-Cymene

### 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-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F). CLASS D-2B: Material causing other toxic effects (TOXIC).

### DSCL (EEC):

R10- Flammable. R36/38- Irritating to eyes and skin. S16- Keep away from sources of ignition - No smoking. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice. S36/37- Wear suitable protective clothing and gloves.

### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 2

**Reactivity:** 0

**Personal Protection:** j

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

**Health:** 1

**Flammability:** 2

**Reactivity:** 0

**Specific hazard:**

### Protective Equipment:

Gloves. Lab coat. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

## Section 16: Other Information

**References:** Not available.

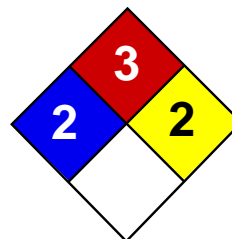
**Other Special Considerations:** Not available.

**Created:** 10/09/2005 05:03 PM

**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

### Styrene (monomer) MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Styrene (monomer)

**Catalog Codes:** SLS2512, SLU1027

**CAS#:** 100-42-5

**RTECS:** WL3675000

**TSCA:** TSCA 8(b) inventory: Styrene (monomer)

**CI#:** Not available.

**Synonym:** Vinylbenzene

**Chemical Formula:** C<sub>8</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
Styrene (monomer)	100-42-5	100

**Toxicological Data on Ingredients:** Styrene (monomer): ORAL (LD<sub>50</sub>): Acute: 2650 mg/kg [Rat]. 316 mg/kg [Mouse]. VAPOR (LC<sub>50</sub>): Acute: 12000 ppm 4 hour(s) [Rat]. 9500 ppm 4 hour(s) [Mouse].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

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

##### Potential Chronic Health Effects:

**CARCINOGENIC EFFECTS:** Classified + (PROVEN) by OSHA. Classified 2B (Possible for human.) by IARC. A4 (Not classifiable for human or animal.) by ACGIH. **MUTAGENIC EFFECTS:** Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not available. The substance is toxic to the nervous system, upper respiratory tract. 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:** 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:** Flammable.

**Auto-Ignition Temperature:** 490°C (914°F)

**Flash Points:** CLOSED CUP: 31.1°C (88°F). (Cleveland) OPEN CUP: 36.7°C (98.1°F) (TAG).

**Flammable Limits:** LOWER: 1.1% UPPER: 6.1%

**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. Slightly flammable to flammable in presence 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.

**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 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/ 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 STEL: 100 (ppm) TWA: 213 STEL: 426 (mg/m3) Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid. (Clear viscous liquid.)

**Odor:** Sweetish. Aromatic.

**Taste:** Not available.

**Molecular Weight:** 104.14 g/mole

**Color:** Colorless.

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

**Boiling Point:** 145.2°C (293.4°F)

**Melting Point:** -30.6°C (-23.1°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 0.906 (Water = 1)

**Vapor Pressure:** 4.5 mm of Hg (@ 20°C)

**Vapor Density:** 3.59 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 0.1 ppm

**Water/Oil Dist. Coeff.:** The product is equally soluble in oil and water; log(oil/water) = 0

**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:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 316 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 9500 ppm 4 hour(s) [Mouse].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified 2B (Possible for human.) by IARC. A4 (Not classifiable for human or animal.) by ACGIH. The substance is toxic to the nervous system, upper respiratory tract.

**Other Toxic Effects on Humans:** 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:**

Animal embryotoxic. Postnatal development injury in animal. Menstrual disorders in human. Human: passes the placental barrier, detected in maternal milk.

**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:** : Styrene monomer, inhibited : UN2055 PG: III

**Special Provisions for Transport:** Marine Pollutant

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Pennsylvania RTK: Styrene (monomer) Florida: Styrene (monomer) Minnesota: Styrene (monomer) Massachusetts RTK: Styrene (monomer) New Jersey: Styrene (monomer) TSCA 8(b) inventory: Styrene (monomer) SARA 313 toxic chemical notification and release reporting: Styrene (monomer) CERCLA: Hazardous substances.: Styrene (monomer)

**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):

R10- Flammable. R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer.

#### 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:** 2

**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

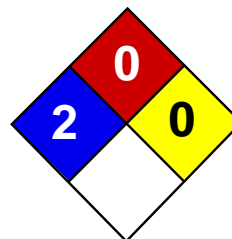
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 06:40 PM

**Last Updated:** 05/21/2013 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; Tetralen; 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.

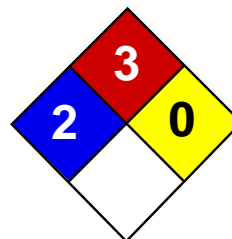


**HMIS (U.S.A.):****Health Hazard:** 2**Fire Hazard:** 0**Reactivity:** 0**Personal Protection:** g**National Fire Protection Association (U.S.A.):****Health:** 2**Flammability:** 0**Reactivity:** 0**Specific hazard:****Protective Equipment:**

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:** 05/21/2013 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:** 05/21/2013 12:00 PM

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## SAFETY DATA SHEET

Version 4.4  
Revision Date 04/02/2014  
Print Date 05/30/2014

### 1. PRODUCT AND COMPANY IDENTIFICATION

#### 1.1 Product identifiers

Product name : *trans*-1,2-Dichloroethylene

Product Number : D62209

Brand : Aldrich

Index-No. : 602-026-00-3

REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No. : 156-60-5

#### 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

#### 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

#### 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

### 2. HAZARDS IDENTIFICATION

#### 2.1 Classification of the substance or mixture

##### GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)

Flammable liquids (Category 2), H225  
Acute toxicity, Inhalation (Category 4), H332  
Acute aquatic toxicity (Category 3), H402  
Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

#### 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H225 : Highly flammable liquid and vapour.  
H332 : Harmful if inhaled.  
H412 : Harmful to aquatic life with long lasting effects.

Precautionary statement(s)

P210 : Keep away from heat/sparks/open flames/hot surfaces. - No smoking.  
P233 : Keep container tightly closed.  
P240 : Ground/bond container and receiving equipment.



P241	Use explosion-proof electrical/ ventilating/ lighting/ equipment.
P242	Use only non-sparking tools.
P243	Take precautionary measures against static discharge.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P271	Use only outdoors or in a well-ventilated area.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/ Take off immediately all contaminated clothing. Rinse skin with water/ shower.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P312	Call a POISON CENTER or doctor/ physician if you feel unwell.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms : trans-1,2-Dichloroethene  
trans-Acetylene dichloride

Formula : C<sub>2</sub>H<sub>2</sub>Cl<sub>2</sub>  
Molecular Weight : 96.94 g/mol  
CAS-No. : 156-60-5  
EC-No. : 205-860-2  
Index-No. : 602-026-00-3

#### Hazardous components

Component	Classification	Concentration
<b>trans-Dichloroethylene</b>		
	Flam. Liq. 2; Acute Tox. 4; Aquatic Acute 3; Aquatic Chronic 3; H225, H332, H412	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

### 4.2 Most important symptoms and effects, both acute and delayed

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

- 4.3 Indication of any immediate medical attention and special treatment needed**  
no data available

---

## 5. FIREFIGHTING MEASURES

### 5.1 Extinguishing media

#### **Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

### 5.2 Special hazards arising from the substance or mixture

Carbon oxides, Hydrogen chloride gas

### 5.3 Advice for firefighters

Wear self contained breathing apparatus for fire fighting if necessary.

### 5.4 Further information

Use water spray to cool unopened containers.

---

## 6. ACCIDENTAL RELEASE MEASURES

### 6.1 Personal precautions, protective equipment and emergency procedures

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

For personal protection see section 8.

### 6.2 Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### 6.3 Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

### 6.4 Reference to other sections

For disposal see section 13.

---

## 7. HANDLING AND STORAGE

### 7.1 Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

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

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Light sensitive. Air and moisture sensitive.

### 7.3 Specific end use(s)

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### 8.1 Control parameters

#### **Components with workplace control parameters**

Component	CAS-No.	Value	Control parameters	Basis
trans-Dichloroethylene	156-60-5	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Remarks	Central Nervous System impairment Eye irritation		

## 8.2 Exposure controls

### Appropriate engineering controls

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

### Personal protective equipment

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Body Protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |   |   |
|---|---|
| a) Appearance                                   | Form: liquid, clear<br>Colour: light yellow                         |
| b) Odour  | no data available   |
| c) Odour Threshold                              | no data available   |
| d) pH   | no data available   |
| e) Melting point/freezing point                 | Melting point/range: -50 °C (-58 °F) - lit.                         |
| f) Initial boiling point and boiling range      | 48 °C (118 °F) - lit.   |
| g) Flash point                                  | 6.0 °C (42.8 °F) - closed cup                                       |
| h) Evaporation rate                             | no data available   |
| i) Flammability (solid, gas)                    | no data available   |
| j) Upper/lower flammability or explosive limits | Upper explosion limit: 12.8 %(V)<br>Lower explosion limit: 9.7 %(V) |
| k) Vapour pressure                              | no data available   |
| l) Vapour density                               | no data available   |
| m) Relative density                             | 1.257 g/mL at 25 °C (77 °F)   |
| n) Water solubility                             | no data available   |
| o) Partition coefficient: n-octanol/water       | no data available   |

- |                              |                   |
|------------------------------|-------------------|
| p) Auto-ignition temperature | no data available |
| q) Decomposition temperature | no data available |
| r) Viscosity                 | no data available |
| s) Explosive properties      | no data available |
| t) Oxidizing properties      | no data available |

## 9.2 Other safety information

no data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

no data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### 10.4 Conditions to avoid

Heat, flames and sparks. Extremes of temperature and direct sunlight.

### 10.5 Incompatible materials

Oxidizing agents, Bases

### 10.6 Hazardous decomposition products

Other decomposition products - no data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - rat - 1,235 mg/kg

LD50 Oral - mouse - 2,122 mg/kg

Remarks: Behavioral: Altered sleep time (including change in righting reflex). Behavioral: Somnolence (general depressed activity). Behavioral: Ataxia.

LC50 Inhalation - rat - 24100 ppm

Remarks: Behavioral: Somnolence (general depressed activity).

LD50 Dermal - rabbit - > 5,000 mg/kg

Remarks: Prolonged skin contact may cause skin irritation and/or dermatitis. Nutritional and Gross Metabolic: Weight loss or decreased weight gain.

no data available

#### Skin corrosion/irritation

Skin - rabbit

Result: Skin irritation - 24 h

#### Serious eye damage/eye irritation

Eyes - rabbit

Result: Eye irritation

#### Respiratory or skin sensitisation

no data available

#### Germ cell mutagenicity

no data available

#### Carcinogenicity

- IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.
- ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.
- NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.
- OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

no data available

no data available

**Specific target organ toxicity - single exposure**

no data available

**Specific target organ toxicity - repeated exposure**

no data available

**Aspiration hazard**

no data available

**Additional Information**

RTECS: KV9400000

prolonged or repeated exposure can cause: narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

Kidney -

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

Toxicity to daphnia and other aquatic invertebrates EC50 - Daphnia magna (Water flea) - 220.00 mg/l - 48 h

### 12.2 Persistence and degradability

no data available

### 12.3 Bioaccumulative potential

no data available

### 12.4 Mobility in soil

no data available

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal. Harmful to aquatic life.

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 1150      Class: 3      Packing group: II  
Proper shipping name: 1,2-Dichloroethylene  
Reportable Quantity (RQ): 1000 lbs  
Marine pollutant: No  
Poison Inhalation Hazard: No

### IMDG

UN number: 1150      Class: 3      Packing group: II      EMS-No: F-E, S-D  
Proper shipping name: 1,2-DICHLOROETHYLENE  
Marine pollutant: No

### IATA

UN number: 1150      Class: 3      Packing group: II  
Proper shipping name: 1,2-Dichloroethylene

---

## 15. REGULATORY INFORMATION

REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

### SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

### SARA 311/312 Hazards

Fire Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

### New Jersey Right To Know Components

	CAS-No.	Revision Date
trans-Dichloroethylene	156-60-5	1993-04-24

### California Prop. 65 Components

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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## 16. OTHER INFORMATION

### Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Flam. Liq.	Flammable liquids
H225	Highly flammable liquid and vapour.
H332	Harmful if inhaled.
H402	Harmful to aquatic life.

### HMIS Rating

Health hazard: 2

Chronic Health Hazard:	*
Flammability:	3
Physical Hazard	0

**NFPA Rating**

Health hazard:	2
Fire Hazard:	3
Reactivity Hazard:	0

**Further information**

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**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 4.4

Revision Date: 04/02/2014

Print Date: 05/30/2014

## Material Safety Data Sheet

Version 5.1

Revision Date 09/25/2013

Print Date 05/30/2014

## 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : *trans*-1,3-Dichloropropene

Product Number : 47793

Brand : Supelco

Supplier : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

Preparation Information : Sigma-Aldrich Corporation  
Product Safety - Americas Region  
1-800-521-8956

## 2. HAZARDS IDENTIFICATION

## Emergency Overview

## OSHA Hazards

Flammable liquid, Toxic by ingestion, Toxic by skin absorption, Skin sensitiser, Irritant, Carcinogen

## Target Organs

Liver, Kidney

## GHS Classification

Flammable liquids (Category 3)  
Acute toxicity, Oral (Category 3)  
Acute toxicity, Inhalation (Category 4)  
Acute toxicity, Dermal (Category 3)  
Skin irritation (Category 2)  
Eye irritation (Category 2A)  
Skin sensitisation (Category 1)  
Carcinogenicity (Category 2)  
Specific target organ toxicity - single exposure (Category 3)  
Aspiration hazard (Category 1)  
Acute aquatic toxicity (Category 1)  
Chronic aquatic toxicity (Category 1)

## GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H226 Flammable liquid and vapour.  
H301 + H311 Toxic if swallowed or in contact with skin  
H304 May be fatal if swallowed and enters airways.  
H315 Causes skin irritation.  
H317 May cause an allergic skin reaction.



H319 Causes serious eye irritation.  
H332 Harmful if inhaled.  
H335 May cause respiratory irritation.  
H351 Suspected of causing cancer.  
H410 Very toxic to aquatic life with long lasting effects.

**Precautionary statement(s)**

P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.  
P273 Avoid release to the environment.  
P280 Wear protective gloves/ protective clothing.  
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P312 Call a POISON CENTER or doctor/ physician if you feel unwell.  
P331 Do NOT induce vomiting.  
P501 Dispose of contents/ container to an approved waste disposal plant.

**HMIS Classification**

**Health hazard:** 2  
**Chronic Health Hazard:** \*  
**Flammability:** 3  
**Physical hazards:** 0

**NFPA Rating**

**Health hazard:** 2  
**Fire:** 3  
**Reactivity Hazard:** 0

**Potential Health Effects**

**Inhalation** May be harmful if inhaled. Causes respiratory tract irritation.  
**Skin** Toxic if absorbed through skin. Causes skin irritation.  
**Eyes** Causes eye irritation.  
**Ingestion** Toxic if swallowed. Aspiration hazard if swallowed - can enter lungs and cause damage.

---

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Formula : C<sub>3</sub>H<sub>4</sub>Cl<sub>2</sub>  
Molecular Weight : 110.97 g/mol

Component		Concentration
<b>(E)-1,3-Dichloropropene</b>		
CAS-No.	10061-02-6	<= 100 %

---

**4. FIRST AID MEASURES**

**General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

---

**5. FIREFIGHTING MEASURES**

**Conditions of flammability**

Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

**Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for firefighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

**Further information**

Use water spray to cool unopened containers.

---

## 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

**Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

---

## 7. HANDLING AND STORAGE

**Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

**Conditions for safe storage**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature: -20 °C

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

Contains no substances with occupational exposure limit values.

**Personal protective equipment**

**Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Splash contact**

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 120 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### **Eye protection**

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### **Skin and body protection**

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### **Hygiene measures**

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

---

## **9. PHYSICAL AND CHEMICAL PROPERTIES**

### **Appearance**

Form	liquid
Colour	no data available

### **Safety data**

pH	no data available
Melting point/freezing point	no data available
Boiling point	112.0 °C (233.6 °F)
Flash point	27 °C (81 °F) - closed cup
Ignition temperature	no data available
Auto-ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	1.23 g/cm <sup>3</sup> at 20 °C (68 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

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## **10. STABILITY AND REACTIVITY**

### **Chemical stability**

Stable under recommended storage conditions.

### **Possibility of hazardous reactions**

Vapours may form explosive mixture with air.

**Conditions to avoid**

Heat, flames and sparks.

**Materials to avoid**

Aluminum, Strong oxidizing agents, Metals, Halogens

**Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Other decomposition products - no data available

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**11. TOXICOLOGICAL INFORMATION****Acute toxicity****Oral LD50**

no data available

**Inhalation LC50**

no data available

**Dermal LD50**

no data available

**Other information on acute toxicity**

no data available

**Skin corrosion/irritation**

no data available

**Serious eye damage/eye irritation**

no data available

**Respiratory or skin sensitisation**

May cause sensitisation by skin contact.

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

no data available

## Teratogenicity

no data available

### Specific target organ toxicity - single exposure (Globally Harmonized System)

May cause respiratory irritation.

### Specific target organ toxicity - repeated exposure (Globally Harmonized System)

no data available

### Aspiration hazard

May be fatal if swallowed and enters airways.

### Potential health effects

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation.
<b>Ingestion</b>	Toxic if swallowed. Aspiration hazard if swallowed - can enter lungs and cause damage.
<b>Skin</b>	Toxic if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	Causes eye irritation.

### Signs and Symptoms of Exposure

To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

### Synergistic effects

no data available

### Additional Information

RTECS: UC8320000

---

## 12. ECOLOGICAL INFORMATION

### Toxicity

no data available

### Persistence and degradability

no data available

### Bioaccumulative potential

no data available

### Mobility in soil

no data available

### PBT and vPvB assessment

no data available

### Other adverse effects

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life with long lasting effects.

---

## 13. DISPOSAL CONSIDERATIONS

### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 2047 Class: 3

Packing group: II

Proper shipping name: Dichloropropenes  
Reportable Quantity (RQ):  
Marine pollutant: No  
Poison Inhalation Hazard: No

**IMDG**

UN number: 2047    Class: 3    Packing group: II    EMS-No: F-E, S-D  
Proper shipping name: DICHLOROPROPENES  
Marine pollutant: No

**IATA**

UN number: 2047    Class: 3    Packing group: II  
Proper shipping name: Dichloropropenes

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**15. REGULATORY INFORMATION**

**OSHA Hazards**

Flammable liquid, Toxic by ingestion, Toxic by skin absorption, Skin sensitiser, Irritant, Carcinogen

**SARA 302 Components**

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
(E)-1,3-Dichloropropene	10061-02-6	2007-07-01

**SARA 311/312 Hazards**

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

**Massachusetts Right To Know Components**

	CAS-No.	Revision Date
(E)-1,3-Dichloropropene	10061-02-6	2007-07-01

**Pennsylvania Right To Know Components**

	CAS-No.	Revision Date
(E)-1,3-Dichloropropene	10061-02-6	2007-07-01

**New Jersey Right To Know Components**

	CAS-No.	Revision Date
(E)-1,3-Dichloropropene	10061-02-6	2007-07-01

**California Prop. 65 Components**

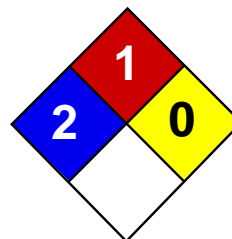
This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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**16. OTHER INFORMATION**

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://www.sigma-aldrich.com) and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.



Health	2
Fire	1
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Trichloroethylene MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Trichloroethylene

**Catalog Codes:** SLT3310, SLT2590

**CAS#:** 79-01-6

**RTECS:** KX4560000

**TSCA:** TSCA 8(b) inventory: Trichloroethylene

**CI#:** Not available.

**Synonym:**

**Chemical Formula:** C<sub>2</sub>HCl<sub>3</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
Trichloroethylene	79-01-6	100

**Toxicological Data on Ingredients:** Trichloroethylene: ORAL (LD50): Acute: 5650 mg/kg [Rat]. 2402 mg/kg [Mouse].  
DERMAL (LD50): Acute: 20001 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:** Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH.

**MUTAGENIC EFFECTS:** Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** Not

available. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract. 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 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:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 420°C (788°F)

**Flash Points:** Not available.

**Flammable Limits:** LOWER: 8% UPPER: 10.5%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>), halogenated compounds.

**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:** 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:**

Keep locked up 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 gas/fumes/ vapour/



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

**Storage:**

Keep container dry. Keep in a cool place. Ground all equipment containing material. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room.

## 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 STEL: 200 (ppm) from ACGIH (TLV) TWA: 269 STEL: 1070 (mg/m<sup>3</sup>) from ACGIH 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:** 131.39 g/mole

**Color:** Clear Colorless.

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

**Boiling Point:** 86.7°C (188.1°F)

**Melting Point:** -87.1°C (-124.8°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.4649 (Water = 1)

**Vapor Pressure:** 58 mm of Hg (@ 20°C)

**Vapor Density:** 4.53 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 20 ppm

**Water/Oil Dist. Coeff.:** The product is equally soluble in oil and water; log(oil/water) = 0

**Ionicity (in Water):** Not available.

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

**Solubility:**

Easily soluble in methanol, 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:** Not available.

**Incompatibility with various substances:** Not available.

**Corrosivity:**

Extremely corrosive in presence of aluminum. 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): 2402 mg/kg [Mouse]. Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A5 (Not suspected for human.) by ACGIH. The substance is toxic to kidneys, the nervous system, liver, heart, upper respiratory tract.

**Other Toxic Effects on Humans:** 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:** Passes through the placental barrier in human. Detected in maternal milk in human.

**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 6.1: Poisonous material.

**Identification:** : Trichloroethylene : UN1710 PG: III

**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: Trichloroethylene 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: Trichloroethylene Pennsylvania RTK: Trichloroethylene Florida: Trichloroethylene Minnesota: Trichloroethylene Massachusetts RTK: Trichloroethylene New Jersey: Trichloroethylene TSCA 8(b) inventory: Trichloroethylene CERCLA: Hazardous substances.: Trichloroethylene

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

### Other Classifications:

#### WHMIS (Canada):

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

#### DSCL (EEC):

R36/38- Irritating to eyes and skin. R45- May cause cancer.

#### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 2

**Flammability:** 1

**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 08:54 PM

**Last Updated:** 05/21/2013 12:00 PM

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# Material Safety Data Sheet



Halocarbon R-11 (Trichlorofluoromethane)

## Section 1. Chemical product and company identification

<b>Product name</b>	: Halocarbon R-11 (Trichlorofluoromethane)
<b>Supplier</b>	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
<b>Product use</b>	: Synthetic/Analytical chemistry.
<b>Synonym</b>	: Aspen R-11; methane, trichlorofluoro-; monofluorotrichloromethane; trichlorofluoromethane; trichlorofluoro methane; freon 11; refrigerant 11; f-11; genetron 11; freon mf; nci-c04637; trichloromonofluoromethane; cfc-11; cfc 11; propellant 11; frigen 11; halon 11; fc 11; khaladon 11; kaltron 11; isotron 11; eskimon 11
<b>MSDS #</b>	: 001052
<b>Date of Preparation/ Revision</b>	: 3/5/2014.
<b>In case of emergency</b>	: 1-866-734-3438

## Section 2. Hazards identification

<b>Physical state</b>	: Liquid. [COLORLESS LIQUID OR GAS WITH A CHLORINATED SOLVENT ODOR WHICH IS DETECTABLE >20 % BY VOLUME]
<b>Emergency overview</b>	: DANGER! MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. May cause target organ damage, based on animal data. Contact with rapidly expanding gases can cause frostbite.
<b>Target organs</b>	: May cause damage to the following organs: heart, peripheral nervous system, cardiovascular system, upper respiratory tract, skin, eyes, central nervous system (CNS).
<b>Routes of entry</b>	: Inhalation
<b>Potential acute health effects</b>	
<b>Eyes</b>	: Irritating to eyes.
<b>Skin</b>	: Irritating to skin.
<b>Inhalation</b>	: Acts as a simple asphyxiant.
<b>Ingestion</b>	: Ingestion is not a normal route of exposure for gases
<b>Potential chronic health effects</b>	
<b>Chronic effects</b>	: May cause target organ damage, based on animal data.
<b>Target organs</b>	: May cause damage to the following organs: heart, peripheral nervous system, cardiovascular system, upper respiratory tract, skin, eyes, central nervous system (CNS).
<b>Medical conditions aggravated by over-exposure</b>	: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.
<b>See toxicological information (Section 11)</b>	

## Section 3. Composition, Information on Ingredients

<u>Name</u>	<u>CAS number</u>	<u>% Volume</u>	<u>Exposure limits</u>
Halocarbon R-11 (Trichlorofluoromethane)	75-69-4	100	<b>ACGIH TLV (United States, 3/2012).</b> C: 5620 mg/m <sup>3</sup> C: 1000 ppm <b>NIOSH REL (United States, 1/2013).</b> CEIL: 5600 mg/m <sup>3</sup> CEIL: 1000 ppm <b>OSHA PEL (United States, 6/2010).</b> TWA: 5600 mg/m <sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours. <b>OSHA PEL 1989 (United States, 3/1989).</b> CEIL: 5600 mg/m <sup>3</sup> CEIL: 1000 ppm

## Section 4. First aid measures

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

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

## Section 5. Fire-fighting measures

- Flammability of the product** : Non-flammable.
- Products of combustion** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide  
halogenated compounds  
carbonyl halides
- Fire-fighting media and instructions** : Use an extinguishing agent suitable for the surrounding fire.
- In a fire or if heated, a pressure increase will occur and the container may burst.
- Special protective equipment for fire-fighters** : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

- Personal precautions** : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8).
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

## Halocarbon R-11 (Trichlorofluoromethane)

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

## Section 7. Handling and storage

- Handling** : Wash thoroughly after handling.
- Storage** : Keep container tightly closed. Keep container in a cool, well-ventilated area.

## Section 8. Exposure controls/personal protection

- Engineering controls** : No special ventilation requirements. Good general ventilation should be sufficient to control worker exposure to airborne contaminants. If this product contains ingredients with exposure limits, use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure below any recommended or statutory limits.

### Personal protection

- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: safety glasses with side-shields.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

### Product name

trichlorofluoromethane

#### **ACGIH TLV (United States, 3/2012).**

C: 5620 mg/m<sup>3</sup>

C: 1000 ppm

#### **NIOSH REL (United States, 1/2013).**

CEIL: 5600 mg/m<sup>3</sup>

CEIL: 1000 ppm

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

TWA: 5600 mg/m<sup>3</sup> 8 hours.

TWA: 1000 ppm 8 hours.

#### **OSHA PEL 1989 (United States, 3/1989).**

CEIL: 5600 mg/m<sup>3</sup>

CEIL: 1000 ppm

**Consult local authorities for acceptable exposure limits.**

## Section 9. Physical and chemical properties

<b>Molecular weight</b>	: 137.36 g/mole
<b>Molecular formula</b>	: C-Cl <sub>3</sub> -F
<b>Boiling/condensation point</b>	: 23.7°C (74.7°F)
<b>Melting/freezing point</b>	: -111°C (-167.8°F)
<b>Critical temperature</b>	: 198°C (388.4°F)
<b>Vapor density</b>	: 4.7 (Air = 1)
<b>Specific Volume (ft<sup>3</sup>/lb)</b>	: 0.6693
<b>Gas Density (lb/ft<sup>3</sup>)</b>	: 1.494

## Section 10. Stability and reactivity

<b>Stability and reactivity</b>	: The product is stable.
<b>Conditions of instability</b>	: Under normal conditions of storage and use, hazardous polymerization will not occur.
<b>Incompatibility with various substances</b>	: Highly reactive or incompatible with the following materials: organic materials and acids.
<b>Hazardous decomposition products</b>	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
<b>Hazardous polymerization</b>	: Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Toxicity data

<b>Product/ingredient name</b>	<b>Result</b>	<b>Species</b>	<b>Dose</b>	<b>Exposure</b>
trichlorofluoromethane	LD Oral	Rat	>352 mg/kg	-
	TDLo Oral	Rat	1.25 mL/kg	-
	LC50 Inhalation	Rat	13 pph	15 minutes
	Gas.			
	LC50 Inhalation	Rat	104800 ppm	1 hours
	Gas.			

**IDLH** : 2000 ppm

**Chronic effects on humans** : **CARCINOGENIC EFFECTS:** A4 (Not classifiable for humans or animals.) by ACGIH. May cause damage to the following organs: heart, peripheral nervous system, cardiovascular system, upper respiratory tract, skin, eyes, central nervous system (CNS).

**Other toxic effects on humans** : No specific information is available in our database regarding the other toxic effects of this material to humans.

### Specific effects

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

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

**Reproduction toxicity** : No known significant effects or critical hazards.

## Section 12. Ecological information

### Aquatic ecotoxicity

Not available.

**Environmental fate** : Not available.



**Environmental hazards** : This product shows a low bioaccumulation potential.

**Toxicity to the environment** : Not available.

## Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

## Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	UN3082	RQ ENVIRONMENTALLY HAZARDOUS SUBSTANCE LIQUID, N.O.S. (TRICHLOROFLUOROMETHANE) (trichlorofluoromethane). Marine pollutant (trichlorofluoromethane) RQ	9	Not applicable (gas).	 	<p>Non-bulk packages of this product are not regulated as hazardous materials in package sizes less than the product reportable quantity, unless transported by inland waterway. The marine pollutant mark is not required when transported on inland waterways in sizes of ≤5 L or ≤5 kg.</p> <p><b><u>Reportable quantity</u></b> 5000 lbs / 2270 kg [401.39 gal / 1519.4 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.</p>



**Halocarbon R-11 (Trichlorofluoromethane)**

<b>TDG Classification</b>	UN3082	RQ ENVIRONMENTALLY HAZARDOUS SUBSTANCE LIQUID, N.O.S. (TRICHLOROFLUOROMETHANE) (trichlorofluoromethane). Marine pollutant (trichlorofluoromethane)	9	Not applicable (gas).	 The product is not regulated as a dangerous good when transported by road or rail.  <b><u>Explosive Limit and Limited Quantity Index</u></b> 5
<b>Mexico Classification</b>	UN3082	RQ ENVIRONMENTALLY HAZARDOUS SUBSTANCE LIQUID, N.O.S. (TRICHLOROFLUOROMETHANE) (trichlorofluoromethane). Marine pollutant (trichlorofluoromethane) RQ	9	Not applicable (gas).	 The environmentally hazardous substance mark is not required when transported in sizes of ≤5 L or ≤5 kg.

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

**Section 15. Regulatory information****United States**

**U.S. Federal regulations** : TSCA 8(a) CDR Exempt/Partial exemption: Not determined  
**United States inventory (TSCA 8b)**: This material is listed or exempted.  
**TSCA 12(b) annual export notification**: trichlorofluoromethane  
**SARA 302/304**: No products were found.  
**SARA 311/312 Hazards identification**: Delayed (chronic) health hazard

**SARA 313**

	<b><u>Product name</u></b>	<b><u>CAS number</u></b>	<b><u>Concentration</u></b>
<b>Form R - Reporting requirements</b>	: Halocarbon R-11 (Trichlorofluoromethane)	75-69-4	100
<b>Supplier notification</b>	: Halocarbon R-11 (Trichlorofluoromethane)	75-69-4	100

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

**State regulations** : **Connecticut Carcinogen Reporting**: This material is not listed.  
**Connecticut Hazardous Material Survey**: This material is not listed.  
**Florida substances**: This material is not listed.  
**Illinois Chemical Safety Act**: This material is not listed.  
**Illinois Toxic Substances Disclosure to Employee Act**: This material is not listed.  
**Louisiana Reporting**: This material is not listed.  
**Louisiana Spill**: This material is not listed.  
**Massachusetts Spill**: This material is not listed.  
**Massachusetts Substances**: This material is listed.  
**Michigan Critical Material**: This material is not listed.  
**Minnesota Hazardous Substances**: This material is not listed.  
**New Jersey Hazardous Substances**: This material is listed.  
**New Jersey Spill**: This material is not listed.  
**New Jersey Toxic Catastrophe Prevention Act**: This material is not listed.  
**New York Acutely Hazardous Substances**: This material is listed.  
**New York Toxic Chemical Release Reporting**: This material is not listed.

**Halocarbon R-11 (Trichlorofluoromethane)**

**Pennsylvania RTK Hazardous Substances:** This material is listed.  
**Rhode Island Hazardous Substances:** This material is not listed.

**Canada**

**WHMIS (Canada)** : Not controlled under WHMIS (Canada).  
**CEPA Toxic substances:** This material is listed.  
**Canadian ARET:** This material is not listed.  
**Canadian NPRI:** This material is listed.  
**Alberta Designated Substances:** This material is not listed.  
**Ontario Designated Substances:** This material is not listed.  
**Quebec Designated Substances:** This material is not listed.

**Section 16. Other information**

**United States**

**Label requirements** : MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.

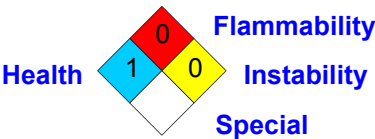
**Canada**

**Label requirements** : Not controlled under WHMIS (Canada).

**Hazardous Material Information System (U.S.A.)** :

Health	*	1
Flammability		0
Physical hazards		1

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



**Notice to reader**

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

# Material Safety Data Sheet



Vinyl Chloride (Chloroethylene)

## Section 1. Chemical product and company identification

<b>Product name</b>	: Vinyl Chloride (Chloroethylene)
<b>Supplier</b>	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
<b>Product use</b>	: Synthetic/Analytical chemistry.
<b>Synonym</b>	: Ethylene, chloro-; Chloroethene; Chloroethylene; Monochloroethylene; Vinyl chloride; Vinyl chloride monomer; Vinyl C monomer; C <sub>2</sub> H <sub>3</sub> Cl; Ethylene monochloride; Monochloroethene; Chlorethene; Chlorethylene; Chlorure de vinyle; Cloruro di vinile; Rcra waste number U043; Trovidur; UN 1086; VC; VCM; Vinile; Vinylchlorid; Vinyl chloride, inhibited; Vinyle(chlorure de); Winylu chlorek; 1-Chloroethylene
<b>MSDS #</b>	: 001067
<b>Date of Preparation/Revision</b>	: <b>4/27/2010.</b>
<b>In case of emergency</b>	: 1-866-734-3438

## Section 2. Hazards identification

<b>Physical state</b>	: Gas. [COLORLESS GAS OR LIQUID (BELOW 7 F) WITH A PLEASANT ODOR AT HIGH CONCENTRATIONS. [NOTE: SHIPPED AS A LIQUEFIED COMPRESSED GAS.]]
<b>Emergency overview</b>	: WARNING! FLAMMABLE GAS. MAY CAUSE FLASH FIRE. HARMFUL IF SWALLOWED. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. CANCER HAZARD - CAN CAUSE CANCER. CONTENTS UNDER PRESSURE.  Keep away from heat, sparks and flame. Do not puncture or incinerate container. Do not ingest. May cause target organ damage, based on animal data. Risk of cancer depends on duration and level of exposure. Use only with adequate ventilation. Wash thoroughly after handling. Keep container closed.  Contact with rapidly expanding gases can cause frostbite.
<b>Target organs</b>	: May cause damage to the following organs: blood, kidneys, liver, mucous membranes, lymphatic system, upper respiratory tract, skin, eyes, central nervous system (CNS).
<b>Routes of entry</b>	: Inhalation
<b>Potential acute health effects</b>	
<b>Eyes</b>	: Irritating to eyes.
<b>Skin</b>	: Irritating to skin.
<b>Inhalation</b>	: Acts as a simple asphyxiant.
<b>Ingestion</b>	: Ingestion is not a normal route of exposure for gases
<b>Potential chronic health effects</b>	: <b>CARCINOGENIC EFFECTS:</b> Classified A1 (Confirmed for humans.) by ACGIH, 1 (Proven for humans.) by IARC, 1 (Known to be human carcinogens.) by NTP, + (Proven.) by OSHA, + (Proven.) by NIOSH, 1 (Proven for humans.) by European Union. <b>MUTAGENIC EFFECTS:</b> Not available. <b>TERATOGENIC EFFECTS:</b> Not available.
<b>Medical conditions aggravated by over-exposure</b>	: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

## Section 3. Composition, Information on Ingredients

<u>Name</u>	<u>CAS number</u>	<u>% Volume</u>	<u>Exposure limits</u>
Vinyl Chloride (Chloroethylene)	75-01-4	100	<b>ACGIH TLV (United States, 1/2009).</b> TWA: 1 ppm 8 hour(s). <b>OSHA PEL (United States, 11/2006).</b> STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s). <b>OSHA PEL 1989 (United States, 3/1989).</b> STEL: 5 ppm 15 minute(s). TWA: 1 ppm 8 hour(s).

## Section 4. First aid measures

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

<b>Eye contact</b>	: Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
<b>Skin contact</b>	: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
<b>Frostbite</b>	: Try to warm up the frozen tissues and seek medical attention.
<b>Inhalation</b>	: Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
<b>Ingestion</b>	: As this product is a gas, refer to the inhalation section.

## Section 5. Fire-fighting measures

<b>Flammability of the product</b>	: Flammable.
<b>Auto-ignition temperature</b>	: 471.85°C (881.3°F)
<b>Flash point</b>	: Open cup: -79.15°C (-110.5°F).
<b>Flammable limits</b>	: Lower: 4% Upper: 22%
<b>Products of combustion</b>	: Decomposition products may include the following materials: carbon dioxide carbon monoxide halogenated compounds
<b>Fire-fighting media and instructions</b>	: In case of fire, use water spray (fog), foam or dry chemical.  In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.  Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.
<b>Special protective equipment for fire-fighters</b>	: Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

## Section 6. Accidental release measures

- Personal precautions** : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.
- Environmental precautions** : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.
- Methods for cleaning up** : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see section 1 for emergency contact information and section 13 for waste disposal.

## Section 7. Handling and storage

- Handling** : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Do not ingest. Keep container closed. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.
- Storage** : 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). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

## Section 8. Exposure controls/personal protection

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

### Personal protection

- Eyes** : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.
- Skin** : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.
- Respiratory** : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.
- The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93
- Hands** : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.
- Personal protection in case of a large spill** : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

### Product name

vinyl chloride

**ACGIH TLV (United States, 1/2009).**

TWA: 1 ppm 8 hour(s).

**OSHA PEL (United States, 11/2006).**

STEL: 5 ppm 15 minute(s).

TWA: 1 ppm 8 hour(s).

**OSHA PEL 1989 (United States, 3/1989).**

STEL: 5 ppm 15 minute(s).

TWA: 1 ppm 8 hour(s).

**Consult local authorities for acceptable exposure limits.**

## Section 9. Physical and chemical properties

<b>Molecular weight</b>	: 62.5 g/mole
<b>Molecular formula</b>	: C <sub>2</sub> H <sub>3</sub> Cl
<b>Boiling/condensation point</b>	: -13.8°C (7.2°F)
<b>Melting/freezing point</b>	: -160°C (-256°F)
<b>Critical temperature</b>	: 158.5°C (317.3°F)
<b>Vapor density</b>	: 2.21 (Air = 1)
<b>Specific Volume (ft<sup>3</sup>/lb)</b>	: 6.25
<b>Gas Density (lb/ft<sup>3</sup>)</b>	: 0.16

## Section 10. Stability and reactivity

<b>Stability and reactivity</b>	: The product is stable.
<b>Incompatibility with various substances</b>	: Extremely reactive or incompatible with the following materials: oxidizing materials.
<b>Hazardous decomposition products</b>	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
<b>Hazardous polymerization</b>	: Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
vinyl chloride	LD50 Oral	Rat	500 mg/kg	-
	LC50 Inhalation Gas.	Rat	18 pph	15 minutes
	LC50 Inhalation Gas.	Rat	5000 ppm	1 hours

<b>Chronic effects on humans</b>	: <b>CARCINOGENIC EFFECTS:</b> Classified A1 (Confirmed for humans.) by ACGIH, 1 (Proven for humans.) by IARC, 1 (Known to be human carcinogens.) by NTP, + (Proven.) by OSHA, + (Proven.) by NIOSH, 1 (Proven for humans.) by European Union. May cause damage to the following organs: blood, kidneys, liver, mucous membranes, lymphatic system, upper respiratory tract, skin, eyes, central nervous system (CNS).
<b>Other toxic effects on humans</b>	: No specific information is available in our database regarding the other toxic effects of this material to humans.

### Specific effects

<b>Carcinogenic effects</b>	: Can cause cancer. Risk of cancer depends on duration and level of exposure.
<b>Mutagenic effects</b>	: No known significant effects or critical hazards.
<b>Reproduction toxicity</b>	: No known significant effects or critical hazards.

## Section 12. Ecological information

### Aquatic ecotoxicity




Not available.

<b>Products of degradation</b>	: Products of degradation: carbon oxides (CO, CO <sub>2</sub> ) and water, halogenated compounds.
<b>Environmental fate</b>	: Not available.
<b>Environmental hazards</b>	: No known significant effects or critical hazards.
<b>Toxicity to the environment</b>	: Not available.

## Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

## Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
<b>DOT Classification</b>	UN1086	VINYL CHLORIDE, STABILIZED	2.1	Not applicable (gas).		<p><b>Reportable quantity</b> 1 lb. (0.454 kg)</p> <p><b>Limited quantity</b> Yes.</p> <p><b>Packaging instruction</b> <b>Passenger aircraft</b> Quantity limitation: Forbidden.</p> <p><b>Cargo aircraft</b> Quantity limitation: 150 kg</p> <p><b>Special provisions</b> 21, B44, T50</p>
<b>TDG Classification</b>	UN1086	VINYL CHLORIDE, STABILIZED	2.1	Not applicable (gas).		<p><b>Explosive Limit and Limited Quantity Index</b> 0.125</p> <p><b>ERAP Index</b> 3000</p> <p><b>Passenger Carrying Road or Rail Index</b> Forbidden</p>
<b>Mexico Classification</b>	UN1086	VINYL CHLORIDE, STABILIZED	2.1	Not applicable (gas).		-

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



## Section 15. Regulatory information

### United States

- U.S. Federal regulations** :
- United States inventory (TSCA 8b):** This material is listed or exempted.
  - SARA 302/304/311/312 extremely hazardous substances:** No products were found.
  - SARA 302/304 emergency planning and notification:** No products were found.
  - SARA 302/304/311/312 hazardous chemicals:** vinyl chloride
  - SARA 311/312 MSDS distribution - chemical inventory - hazard identification:** vinyl chloride: Fire hazard, reactive, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard
  - Clean Water Act (CWA) 307:** vinyl chloride
  - Clean Water Act (CWA) 311:** No products were found.
  - Clean Air Act (CAA) 112 accidental release prevention:** vinyl chloride
  - Clean Air Act (CAA) 112 regulated flammable substances:** vinyl chloride
  - Clean Air Act (CAA) 112 regulated toxic substances:** No products were found.

### SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
<b>Form R - Reporting requirements</b>	: Vinyl Chloride (Chloroethylene)	75-01-4	100
<b>Supplier notification</b>	: Vinyl Chloride (Chloroethylene)	75-01-4	100

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

- State regulations** :
- Connecticut Carcinogen Reporting:** This material is not listed.
  - Connecticut Hazardous Material Survey:** This material is not listed.
  - Florida substances:** This material is not listed.
  - Illinois Chemical Safety Act:** This material is not listed.
  - Illinois Toxic Substances Disclosure to Employee Act:** This material is not listed.
  - Louisiana Reporting:** This material is not listed.
  - Louisiana Spill:** This material is not listed.
  - Massachusetts Spill:** This material is not listed.
  - Massachusetts Substances:** This material is listed.
  - Michigan Critical Material:** This material is not listed.
  - Minnesota Hazardous Substances:** This material is not listed.
  - New Jersey Hazardous Substances:** This material is listed.
  - New Jersey Spill:** This material is not listed.
  - New Jersey Toxic Catastrophe Prevention Act:** This material is not listed.
  - New York Acutely Hazardous Substances:** This material is listed.
  - New York Toxic Chemical Release Reporting:** This material is not listed.
  - Pennsylvania RTK Hazardous Substances:** This material is listed.
  - Rhode Island Hazardous Substances:** This material is not listed.

- California Prop. 65** : **WARNING:** This product contains a chemical known to the State of California to cause cancer.

<u>Ingredient name</u>	<u>Cancer</u>	<u>Reproductive</u>	<u>No significant risk level</u>	<u>Maximum acceptable dosage level</u>
Vinyl Chloride (Chloroethylene)	Yes.	No.	Yes.	No.

### Canada

- WHMIS (Canada)** :
- Class A: Compressed gas.
  - Class B-1: Flammable gas.
  - Class D-2A: Material causing other toxic effects (Very toxic).
  - Class D-2B: Material causing other toxic effects (Toxic).
  - Class F: Dangerously reactive material.



**Vinyl Chloride (Chloroethylene)**

**CEPA Toxic substances:** This material is listed.  
**Canadian ARET:** This material is not listed.  
**Canadian NPRI:** This material is listed.  
**Alberta Designated Substances:** This material is not listed.  
**Ontario Designated Substances:** This material is not listed.  
**Quebec Designated Substances:** This material is not listed.

**Section 16. Other information**

**United States**

**Label requirements** : FLAMMABLE GAS.  
MAY CAUSE FLASH FIRE.  
HARMFUL IF SWALLOWED.  
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.  
CANCER HAZARD - CAN CAUSE CANCER.  
CONTENTS UNDER PRESSURE.

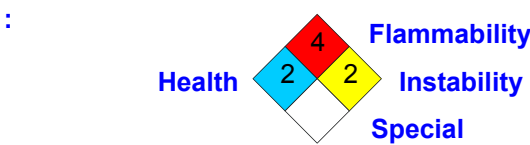
**Canada**

**Label requirements** : Class A: Compressed gas.  
Class B-1: Flammable gas.  
Class D-2A: Material causing other toxic effects (Very toxic).  
Class D-2B: Material causing other toxic effects (Toxic).  
Class F: Dangerously reactive material.

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

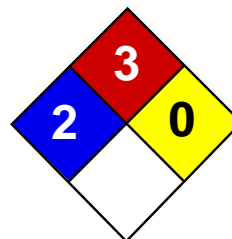
Health	*	2
Flammability		4
Physical hazards		2

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



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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/m3) [Canada] TWA: 434 STEL: 651 (mg/m3) from ACGIH (TLV) [United States]  
TWA: 100 STEL: 150 (ppm) from ACGIH (TLV) [United States] Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Sweetish.

**Taste:** Not available.

**Molecular Weight:** 106.17 g/mole

**Color:** Colorless. Clear

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

**Boiling Point:** 138.5°C (281.3°F)

**Melting Point:** -47.4°C (-53.3°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 0.864 (Water = 1)

**Vapor Pressure:** 0.9 kPa (@ 20°C)

**Vapor Density:** 3.7 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 1 ppm

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

**Ionicity (in Water):** Not available.

**Dispersion Properties:** Not available.

**Solubility:**

Insoluble in cold water, hot water. Miscible with absolute alcohol, ether, and many other organic liquids.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, ignition sources, incompatibles

**Incompatibility with various substances:** Reactive with oxidizing agents, acids.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Store away from acetic acid, nitric acid, chlorine, bromine, and fluorine.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

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

**Toxicity to Animals:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 2119 mg/kg [Mouse]. Acute dermal toxicity (LD50): >1700 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 5000 4 hours [Rat].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. May cause damage to the following organs: blood, kidneys, liver, mucous membranes, bone marrow, central nervous system (CNS).

**Other Toxic Effects on Humans:** Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

**Special Remarks on Toxicity to Animals:**

Lowest Lethal Dose: LDL [Human] - Route: Oral; Dose: 50 mg/kg LCL [Man] - Route: Oral; Dose: 10000 ppm/6H

**Special Remarks on Chronic Effects on Humans:**

Detected in maternal milk in human. Passes through the placental barrier in animal. Embryotoxic and/or foetotoxic in animal. May cause adverse reproductive effects (male and female fertility (spontaneous abortion and fetotoxicity)) and birth defects based animal data.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: Causes skin irritation. Can be absorbed through skin. Eyes: Causes eye irritation. Inhalation: Vapor causes respiratory tract and mucous membrane irritation. May affect central nervous system and behavior (General anesthetic/CNS depressant with effects including headache, weakness, memory loss, irritability, dizziness, giddiness, loss of coordination and judgement, respiratory depression/arrest or difficulty breathing, loss of appetite, nausea, vomiting, shivering, and possible coma and death). May also affects blood, sense organs, liver, and peripheral nerves. Ingestion: May cause gastrointestinal irritation including abdominal pain, vomiting, and nausea. May also affect liver and urinary system/kidneys. May cause effects similar to those of acute inhalation. Chronic Potential Health Effects: Chronic inhalation may affect the urinary system (kidneys) blood (anemia), bone marrow (hyperplasia of bone marrow) brain/behavior/Central Nervous system. Chronic inhalation may also cause mucosal bleeding. Chronic ingestion may affect the liver and metabolism (loss of appetite) and may affect urinary system (kidney damage)

## Section 12: Ecological Information

**Ecotoxicity:** Not available.

**BOD5 and COD:** Not available.

**Products of Biodegradation:**

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

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

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

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

## Section 14: Transport Information

**DOT Classification:** CLASS 3: Flammable liquid.

**Identification :** Xylenes UNNA: 1307 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

Connecticut hazardous material survey.: Xylenes Illinois chemical safety act: Xylenes New York acutely hazardous substances: Xylenes Rhode Island RTK hazardous substances: Xylenes Pennsylvania RTK: Xylenes Minnesota: Xylenes Michigan critical material: Xylenes Massachusetts RTK: Xylenes Massachusetts spill list: Xylenes New Jersey: Xylenes New Jersey spill list: Xylenes Louisiana spill reporting: Xylenes California Director's List of Hazardous Substances: Xylenes TSCA 8(b) inventory: Xylenes SARA 302/304/311/312 hazardous chemicals: Xylenes SARA 313 toxic chemical notification and release reporting: Xylenes CERCLA: Hazardous substances.: Xylenes: 100 lbs. (45.36 kg)

**Other Regulations:**

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

**Other Classifications:**

**WHMIS (Canada):**

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

**DSCL (EEC):**

R10- Flammable. R21- Harmful in contact with skin. R36/38- Irritating to eyes and skin. S2- Keep out of the reach of children. S36/37- Wear suitable protective clothing and gloves. S46- If swallowed, seek medical advice immediately and show this container or label.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 2

**Flammability:** 3

**Reactivity:** 0

**Specific hazard:**

**Protective Equipment:**

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

**Section 16: Other Information**

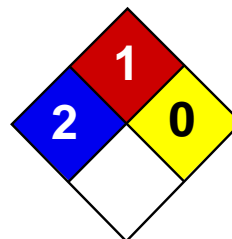
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/11/2005 12:54 PM

**Last Updated:** 05/21/2013 12:00 PM

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Health	2
Fire	1
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### 1,1,1-Trichloroethane MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** 1,1,1-Trichloroethane

**Catalog Codes:**

**CAS#:** 71-55-6

**RTECS:** KJ2975000

**TSCA:** TSCA 8(b) inventory: 1,1,1-Trichloroethane

**CI#:** Not available.

**Synonym:**

**Chemical Formula:** CH<sub>3</sub>CCl<sub>3</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
{1,1,1-}Trichloroethane	71-55-6	100

**Toxicological Data on Ingredients:** 1,1,1-Trichloroethane: ORAL (LD50): Acute: 9600 mg/kg [Rat]. 6000 mg/kg [Mouse]. DERMAL (LD50): Acute: 15800 mg/kg [Rabbit]. VAPOR (LC50): Acute: 18000 ppm 4 hour(s) [Rat].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

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

##### Potential Chronic Health Effects:

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, liver, 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 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:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 537°C (998.6°F)

**Flash Points:** Not available.

**Flammable Limits:** LOWER: 7.5% UPPER: 12.5%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>), halogenated compounds.

**Fire Hazards in Presence of Various Substances:** Slightly flammable to flammable in presence of oxidizing materials, of acids, of alkalis.

**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 to explosive in presence of oxidizing materials, of acids, of alkalis.

**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:** 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:**

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 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:**

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:**

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: 350 STEL: 440 CEIL: 440 (ppm) from ACGIH (TLV) [1995] TWA: 1900 STEL: 2460 CEIL: 2380 (mg/m<sup>3</sup>) from ACGIH [1995] 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:** 133.41 g/mole

**Color:** Not available.

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

**Boiling Point:** 74.1°C (165.4°F)

**Melting Point:** -32.5°C (-26.5°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.3376 (Water = 1)

**Vapor Pressure:** 100 mm of Hg (@ 20°C)

**Vapor Density:** 4.6 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 400 ppm

**Water/Oil Dist. Coeff.:** The product is equally soluble in oil and water; log(oil/water) = 0

**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:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 6000 mg/kg [Mouse]. Acute dermal toxicity (LD50): 15800 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 18000 ppm 4 hour(s) [Rat].

**Chronic Effects on Humans:** The substance is toxic to lungs, the nervous system, liver, mucous membranes.

**Other Toxic Effects on Humans:**

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

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Detected in maternal milk in human.

**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 6.1: Poisonous material.

**Identification:** : 1,1,1-Trichloroethane : UN2831 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Pennsylvania RTK: 1,1,1-Trichloroethane Massachusetts RTK: 1,1,1-Trichloroethane TSCA 8(b) inventory: 1,1,1-Trichloroethane SARA 313 toxic chemical notification and release reporting: 1,1,1-Trichloroethane CERCLA: Hazardous substances.: 1,1,1-Trichloroethane

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

### Other Classifications:

**WHMIS (Canada):** CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

### DSCL (EEC):

R38- Irritating to skin. R41- Risk of serious damage to eyes.

### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 2

**Flammability:** 1

**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

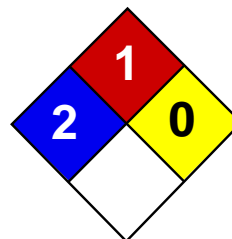
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:31 PM

**Last Updated:** 05/21/2013 12:00 PM

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Health	2
Fire	1
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### 1,1,2,2-Tetrachloroethane MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** 1,1,2,2-Tetrachloroethane

**Catalog Codes:** SLT1927

**CAS#:** 79-34-5

**RTECS:** KI8575000

**TSCA:** TSCA 8(b) inventory: 1,1,2,2-Tetrachloroethane

**CI#:** Not available.

**Synonym:**

**Chemical Name:** Not available.

**Chemical Formula:** C<sub>2</sub>H<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
{1,1,2,2-}Tetrachloroethane	79-34-5	100

**Toxicological Data on Ingredients:** 1,1,2,2-Tetrachloroethane: ORAL (LD50): Acute: 250 mg/kg [Rat]. DERMAL (LD50): Acute: 6400 mg/kg [Rabbit]. VAPOR (LC50): Acute: 2250 ppm 4 hour(s) [Mouse].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

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

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified 2 (Reasonably anticipated.) by NTP. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to blood, kidneys, the nervous system, liver. 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. **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. 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:** Not available.

**Flammable Limits:** Not available.

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>), halogenated compounds.

**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:** 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:**

Keep locked up 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 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:**

Keep container dry. Keep in a cool place. Ground all equipment containing material. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room.

## 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: 1 (ppm) from ACGIH (TLV) SKIN TWA: 6.9 (mg/m<sup>3</sup>) from ACGIH SKIN 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:** 167.86 g/mole

**Color:** Not available.

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

**Boiling Point:** 146.5°C (295.7°F)

**Melting Point:** -44°C (-47.2°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.5866 (Water = 1)

**Vapor Pressure:** 8 mm of Hg (@ 20°C)

**Vapor Density:** 5.77 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 3 ppm

**Water/Oil Dist. Coeff.:** The product is equally soluble in oil and water; log(oil/water) = 0

**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:**

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE. Acute oral toxicity (LD50): 250 mg/kg [Rat]. Acute dermal toxicity (LD50): 6400 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 2250 ppm 4 hour(s) [Mouse].

### **Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified 2 (Reasonably anticipated.) by NTP. The substance is toxic to blood, kidneys, the nervous system, liver.

### **Other Toxic Effects on Humans:**

Very hazardous in case of ingestion, of inhalation. 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:** 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 6.1: Poisonous material.

**Identification:** : Tetrachloroethane : UN1702 PG: II

**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: 1,1,2,2-Tetrachloroethane  
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: 1,1,2,2-Tetrachloroethane  
Pennsylvania RTK: 1,1,2,2-Tetrachloroethane  
Massachusetts RTK: 1,1,2,2-Tetrachloroethane  
TSCA 8(b) inventory: 1,1,2,2-Tetrachloroethane  
SARA 313 toxic chemical notification and release reporting: 1,1,2,2-Tetrachloroethane  
CERCLA: Hazardous substances.: 1,1,2,2-Tetrachloroethane

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

### Other Classifications:

**WHMIS (Canada):** CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).

### DSCL (EEC):

R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer.

### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 2

**Flammability:** 1

**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.

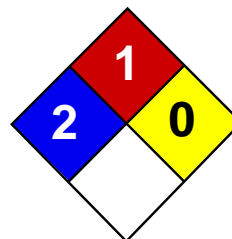
**Other Special Considerations:** Not available.

**Created:** 10/10/2005 12:01 AM

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Health	2
Fire	1
Reactivity	0
Personal Protection	J

## Material Safety Data Sheet

### 1,1,2-Trichloroethane MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** 1,1,2-Trichloroethane

**Catalog Codes:** SLT1450

**CAS#:** 79-00-5

**RTECS:** KJ3150000

**TSCA:** TSCA 8(b) inventory: 1,1,2-Trichloroethane

**CI#:** Not applicable.

**Synonym:** beta-T; beta-Trichloroethane

**Chemical Name:** 1,1,2-Trichloroethane

**Chemical Formula:** C<sub>2</sub>H<sub>3</sub>Cl<sub>3</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
{1,1,2-}Trichloroethane	79-00-5	100

**Toxicological Data on Ingredients:** 1,1,2-Trichloroethane: ORAL (LD50): Acute: 836 mg/kg [Rat]. 378 mg/kg [Mouse]. DERMAL (LD50): Acute: 5377 mg/kg [Rabbit].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

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

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammals. Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to lungs, the nervous system, liver, brain, digestive system, gastrointestinal tract, endocrine. 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:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 459°C (858.2°F)

**Flash Points:** Not available.

**Flammable Limits:** LOWER: 6% UPPER: 15.5%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>), halogenated compounds.

**Fire Hazards in Presence of Various Substances:** Slightly flammable to 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:**

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:** 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:**

Keep locked up 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 gas/fumes/ vapour/spray. 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:**

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. Gloves.

**Personal Protection in Case of a Large Spill:**

Splash goggles. Full suit. Boots. Gloves. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

**Exposure Limits:**

USA: TWA: 10 (ppm) from OSHA (PEL) SKIN TWA: 55 (mg/m<sup>3</sup>) from ACGIH SKIN Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid. (Clear)

**Odor:** Sweet chloroform like

**Taste:** Not available.

**Molecular Weight:** 133.41 g/mole

**Color:** Colorless.

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

**Boiling Point:** 113.8°C (236.8°F)

**Melting Point:** -36.6°C (-33.9°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.4416 (Water = 1)

**Vapor Pressure:** Not available.

**Vapor Density:** 4.63 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** The product is more soluble in oil; log(oil/water) = 2.2

**Ionicity (in Water):** Not available.

**Dispersion Properties:**

Partially dispersed in methanol, diethyl ether. See solubility in water, methanol, diethyl ether, acetone.

**Solubility:**

Partially soluble in methanol, 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:** Not available.

**Incompatibility with various substances:** Slightly reactive to reactive with oxidizing agents, metals, alkalis.

**Corrosivity:** Corrosive in presence of aluminum, of zinc.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Not available.

**Polymerization:** No.

## Section 11: Toxicological Information

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

**Toxicity to Animals:**

Acute oral toxicity (LD50): 378 mg/kg [Mouse]. Acute dermal toxicity (LD50): 5377 mg/kg [Rabbit].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: 3 (Not classifiable for human.) by IARC. MUTAGENIC EFFECTS: Mutagenic for mammals. Mutagenic for bacteria and/or yeast. The substance is toxic to lungs, the nervous system, liver, brain, digestive system, gastrointestinal tract, endocrine.

**Other Toxic Effects on Humans:** Hazardous in case of skin contact (irritant).

**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 as toxic as the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

## Section 14: Transport Information

**DOT Classification:** CLASS 6.1: Poisonous material.

**Identification:** : Toxic liquids n.o.s. : UN2810 PG: Not available.

**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: 1,1,2-Trichloroethane California prop. 65 (no significant risk level): 1,1,2-Trichloroethane: 0.01 mg/day (inhalation) 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: 1,1,2-Trichloroethane Rhode Island RTK hazardous substances: 1,1,2-Trichloroethane Pennsylvania RTK: 1,1,2-Trichloroethane Florida: 1,1,2-Trichloroethane Minnesota: 1,1,2-Trichloroethane Michigan critical material: 1,1,2-Trichloroethane Massachusetts RTK: 1,1,2-Trichloroethane New Jersey: 1,1,2-Trichloroethane TSCA 8(b) inventory: 1,1,2-Trichloroethane TSCA 8(a) PAIR: 1,1,2-Trichloroethane SARA 313 toxic chemical notification and release reporting: 1,1,2-Trichloroethane CERCLA: Hazardous substances.: 1,1,2-Trichloroethane: 100 lbs. (45.36 kg)

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

### Other Classifications:

**WHMIS (Canada):** CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

### DSCL (EEC):

R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes.

### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** j

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

**Health:** 2

**Flammability:** 1

**Reactivity:** 0

**Specific hazard:**

### Protective Equipment:

Gloves. Lab coat. Wear appropriate respirator when ventilation is inadequate. Splash goggles.

## Section 16: Other Information

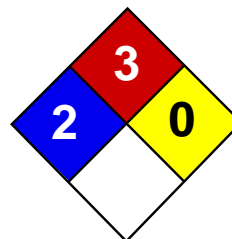
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/11/2005 12:48 PM

**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

### 1,1-Dichloroethane MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** 1,1-Dichloroethane

**Catalog Codes:** SLD3280

**CAS#:** 75-34-3

**RTECS:** KI0175000

**TSCA:** TSCA 8(b) inventory: 1,1-Dichloroethane

**CI#:** Not available.

**Synonym:**

**Chemical Name:** 1,1-Dichloroethane

**Chemical Formula:** C<sub>2</sub>H<sub>4</sub>Cl<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
{1,1-}Dichloroethane	75-34-3	100

**Toxicological Data on Ingredients:** 1,1-Dichloroethane: ORAL (LD50): Acute: 725 mg/kg [Rat].

#### Section 3: Hazards Identification

**Potential Acute Health Effects:** Hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation.

**Potential Chronic Health Effects:**

CARCINOGENIC EFFECTS: Classified 2 (Reasonably anticipated.) by NTP. 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 kidneys, lungs, liver, 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. 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:** 458°C (856.4°F)

**Flash Points:** CLOSED CUP: -17°C (1.4°F). OPEN CUP: -6°C (21.2°F).

**Flammable Limits:** LOWER: 5.6% UPPER: 11.4%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>), halogenated compounds.

**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 liquid. 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:** 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 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/ vapour/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, alkalis.

**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: 100 STEL: 250 (ppm) from ACGIH (TLV) [1999] TWA: 100 (ppm) from OSHA (PEL) Australia: TWA: 200 (ppm) Consult local authorities for acceptable exposure limits.

**Section 9: Physical and Chemical Properties**

**Physical state and appearance:** Liquid. (Oily liquid.)

**Odor:** Chloroform like odor (Slight.)

**Taste:** Not available.

**Molecular Weight:** 98.96 g/mole

**Color:** Colorless.

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

**Boiling Point:** 57.3°C (135.1°F)

**Melting Point:** -96.9°C (-142.4°F)

**Critical Temperature:** 261.5°C (502.7°F)

**Specific Gravity:** 1.175 (Water = 1)

**Vapor Pressure:** 180 mm of Hg (@ 20°C)

**Vapor Density:** 3.44 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 120 ppm

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:**

Partially dispersed in diethyl ether. See solubility in water, diethyl ether.

**Solubility:** Partially soluble in diethyl ether.

**Section 10: Stability and Reactivity Data**

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Not available.

**Incompatibility with various substances:** Reactive with oxidizing agents, alkalis.

**Corrosivity:** Corrosive in presence of aluminum.

**Special Remarks on Reactivity:** Not available.

**Special Remarks on Corrosivity:** Will attack some forms of plastic and rubber

**Polymerization:** No.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. Eye contact. Inhalation. Ingestion.

**Toxicity to Animals:** Acute oral toxicity (LD50): 725 mg/kg [Rat].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified 2 (Reasonably anticipated.) by NTP. A4 (Not classifiable for human or animal.) by ACGIH. DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE]. The substance is toxic to kidneys, lungs, liver, central nervous system (CNS).

**Other Toxic Effects on Humans:** Hazardous in case of skin contact (irritant), 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 as toxic as the product itself.

**Special Remarks on the Products of Biodegradation:** Not available.

## Section 13: Disposal Considerations

**Waste Disposal:**

## Section 14: Transport Information

**DOT Classification:**

CLASS 3: Combustible liquid with a flash point greater than 37.8C (100F). Marine pollutant

**Identification:** : 1,1-Dichloroethane : UN2362 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

California prop. 65 (no significant risk level): 1,1-Dichloroethane 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: 1,1-Dichloroethane Rhode Island RTK hazardous substances: 1,1-Dichloroethane Pennsylvania RTK: 1,1-Dichloroethane Florida: 1,1-Dichloroethane Minnesota: 1,1-Dichloroethane Massachusetts RTK: 1,1-Dichloroethane New Jersey: 1,1-Dichloroethane New Jersey spill list: 1,1-Dichloroethane TSCA 8(b) inventory: 1,1-Dichloroethane TSCA 8(a) PAIR: 1,1-Dichloroethane TSCA 8(d) H and S data reporting: 1,1-Dichloroethane: June 1999 TSCA 12(b) one time export: 1,1-Dichloroethane SARA 313 toxic chemical notification and release reporting: 1,1-Dichloroethane: 1% CERCLA: Hazardous substances.: 1,1-Dichloroethane: 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-2B: Material causing other toxic effects (TOXIC).

#### DSCL (EEC):

R11- Highly flammable. R22- Harmful if swallowed. R37/38- Irritating to respiratory system and skin. R41- Risk of serious damage to eyes. R52- Harmful to aquatic organisms.

#### 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.

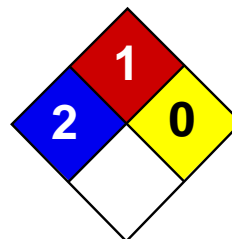
**Other Special Considerations:** Not available.

**Created:** 10/09/2005 05:07 PM

**Last Updated:** 05/21/2013 12:00 PM

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Health	2
Fire	1
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### 1,2,4-Trichlorobenzene MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** 1,2,4-Trichlorobenzene

**Catalog Codes:** SLT3619

**CAS#:** 120-82-1

**RTECS:** DC2100000

**TSCA:** TSCA 8(b) inventory: 1,2,4-Trichlorobenzene

**CI#:** Not applicable.

**Synonym:**

**Chemical Name:** 1,2,4,-Trichlorobenzene

**Chemical Formula:** C<sub>6</sub>H<sub>3</sub>Cl<sub>3</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
{1,2,4-}Trichlorobenzene	120-82-1	100

**Toxicological Data on Ingredients:** 1,2,4-Trichlorobenzene: ORAL (LD50): Acute: 756 mg/kg [Rat.]. 300 mg/kg [Mouse]. DERMAL (LD50): Acute: 6139 mg/kg [Rat.].

#### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Extremely hazardous in case of skin contact (irritant, permeator), of eye contact (irritant). Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (sensitizer). 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:**

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to blood, kidneys, liver, upper respiratory tract. 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. 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:** May be combustible at high temperature.

**Auto-Ignition Temperature:** 571°C (1059.8°F)

**Flash Points:** CLOSED CUP: 110°C (230°F).

**Flammable Limits:** LOWER: 2.5% UPPER: 6.6%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>), halogenated compounds.

**Fire Hazards in Presence of Various Substances:**

Flammable in presence of open flames and sparks, of oxidizing materials. Slightly flammable to flammable in presence of heat, of reducing materials, of combustible materials. Non-flammable in presence of moisture.

**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:** Keep container tightly closed.

**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:**

If the product is in its solid form: Use a shovel to put the material into a convenient waste disposal container. If the product is in its liquid form: 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:**

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 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. Keep away from incompatibles such as oxidizing agents, reducing agents, organic materials, metals, acids, alkalis.

**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:**

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: 5 (ppm) TWA: 37 (mg/m3) Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid. (Liquid.)

**Odor:** Pungent. (Slight.)

**Taste:** Toxic by ingestion.

**Molecular Weight:** 181.46 g/mole

**Color:** Colorless.

**pH (1% soln/water):** Not applicable.

**Boiling Point:** 213°C (415.4°F)

**Melting Point:** 17°C (62.6°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.45 (Water = 1)

**Vapor Pressure:** Not available.

**Vapor Density:** 6.26 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** Not available.

**Water/Oil Dist. Coeff.:** Not available.

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, methanol, diethyl ether, n-octanol.



**Solubility:**

Easily soluble in diethyl ether. Soluble in methanol, n-octanol. Insoluble 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. Reactive with reducing agents, organic materials, metals, acids, alkalis.

**Corrosivity:**

Slightly corrosive to corrosive in presence of steel, of copper. 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): 300 mg/kg [Mouse]. Acute dermal toxicity (LD50): 6139 mg/kg [Rat.].

**Chronic Effects on Humans:** The substance is toxic to blood, kidneys, liver, upper respiratory tract.

**Other Toxic Effects on Humans:**

Extremely hazardous in case of skin contact (irritant, permeator). Very hazardous in case of ingestion, of inhalation. Slightly hazardous in case of skin contact (sensitizer).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Can cause gastrointestinal disturbances.

**Special Remarks on other Toxic Effects on Humans:** Exposure can cause nausea, headache and vomiting.

**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 6.1: Poisonous material.

**Identification :** Trichlorobenzene : UN2321 PG: III

**Special Provisions for Transport:** Marine Pollutant

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Pennsylvania RTK: 1,2,4-Trichlorobenzene Florida: 1,2,4-Trichlorobenzene Minnesota: 1,2,4-Trichlorobenzene Massachusetts RTK: 1,2,4-Trichlorobenzene New Jersey: 1,2,4-Trichlorobenzene TSCA 8(b) inventory: 1,2,4-Trichlorobenzene SARA 313 toxic chemical notification and release reporting: 1,2,4-Trichlorobenzene CERCLA: Hazardous substances.: 1,2,4-Trichlorobenzene

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

### Other Classifications:

#### WHMIS (Canada):

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC). CLASS D-2B: Material causing other toxic effects (TOXIC).

#### DSCL (EEC):

R38- Irritating to skin. R41- Risk of serious damage to eyes.

#### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 1

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 2

**Flammability:** 1

**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:

-Material safety data sheet emitted by: la Commission de la Santé et de la Sécurité du Travail du Québec. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:31 PM

**Last Updated:** 05/21/2013 12:00 PM

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## SAFETY DATA SHEET

Version 5.1

Revision Date 04/05/2014

Print Date 05/30/2014

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : 1,2-Dibromo-3-chloropropane

Product Number : 676713

Brand : Aldrich

Index-No. : 602-021-00-6

REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No. : 96-12-8

## 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

## 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

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2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Flammable liquids (Category 4), H227

Acute toxicity, Oral (Category 3), H301

Germ cell mutagenicity (Category 1B), H340

Carcinogenicity (Category 1B), H350

Reproductive toxicity (Category 1A), H360

Specific target organ toxicity - repeated exposure (Category 2), H373

Acute aquatic toxicity (Category 3), H402

Chronic aquatic toxicity (Category 3), H412

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H227 Combustible liquid

H301 Toxic if swallowed.

H340 May cause genetic defects.

H350 May cause cancer.

H360	May damage fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.
H412	Harmful to aquatic life with long lasting effects.
Precautionary statement(s)	
P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P210	Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
P260	Do not breathe dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P273	Avoid release to the environment.
P280	Wear protective gloves/ protective clothing/ eye protection/ face protection.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.
P308 + P313	IF exposed or concerned: Get medical advice/ attention.
P321	Specific treatment (see supplemental first aid instructions on this label).
P330	Rinse mouth.
P370 + P378	In case of fire: Use dry sand, dry chemical or alcohol-resistant foam for extinction.
P403 + P235	Store in a well-ventilated place. Keep cool.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

## 3. COMPOSITION/INFORMATION ON INGREDIENTS

### 3.1 Substances

Synonyms	: DBCP
Formula	: C <sub>3</sub> H <sub>5</sub> Br <sub>2</sub> Cl
Molecular Weight	: 236.33 g/mol
CAS-No.	: 96-12-8
EC-No.	: 202-479-3
Index-No.	: 602-021-00-6

#### Hazardous components

Component	Classification	Concentration
<b>1,2-Dibromo-3-chloropropane</b>		
	Flam. Liq. 4; Acute Tox. 3; Muta. 1B; Carc. 1B; Repr. 1A; STOT RE 2; Aquatic Acute 3; Aquatic Chronic 3; H227, H301, H340, H350, H360, H373, H412	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 4. FIRST AID MEASURES

### 4.1 Description of first aid measures

#### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

**4.2 Most important symptoms and effects, both acute and delayed**

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

**4.3 Indication of any immediate medical attention and special treatment needed**

no data available

---

**5. FIREFIGHTING MEASURES****5.1 Extinguishing media****Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**5.2 Special hazards arising from the substance or mixture**

Carbon oxides, Hydrogen chloride gas, Hydrogen bromide gas

**5.3 Advice for firefighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**5.4 Further information**

Use water spray to cool unopened containers.

---

**6. ACCIDENTAL RELEASE MEASURES****6.1 Personal precautions, protective equipment and emergency procedures**

Wear respiratory protection. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations.

Vapours can accumulate in low areas.

For personal protection see section 8.

**6.2 Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**6.3 Methods and materials for containment and cleaning up**

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13). Keep in suitable, closed containers for disposal.

**6.4 Reference to other sections**

For disposal see section 13.

---

**7. HANDLING AND STORAGE****7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

For precautions see section 2.2.

**7.2 Conditions for safe storage, including any incompatibilities**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

**7.3 Specific end use(s)**

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****8.1 Control parameters****Components with workplace control parameters**

Contains no substances with occupational exposure limit values.

## 8.2 Exposure controls

### Appropriate engineering controls

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

### Personal protective equipment

#### Eye/face protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Full contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

#### Splash contact

Material: butyl-rubber

Minimum layer thickness: 0.3 mm

Break through time: 60 min

Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

#### Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |  |  |
|--|--|
| a) Appearance                              | Form: liquid                                     |
| b) Odour                                   | no data available                                |
| c) Odour Threshold                         | no data available                                |
| d) pH                                      | no data available                                |
| e) Melting point/freezing point            | no data available                                |
| f) Initial boiling point and boiling range | 60 - 65 °C (140 - 149 °F) at 10.0 hPa (7.5 mmHg) |
| g) Flash point                             | 76.7 °C (170.1 °F)                               |
| h) Evapouration rate                       | no data available                                |

- i) Flammability (solid, gas) no data available
- j) Upper/lower flammability or explosive limits no data available
- k) Vapour pressure no data available
- l) Vapour density no data available
- m) Relative density 2.081 g/cm<sup>3</sup> at 25 °C (77 °F)
- n) Water solubility no data available
- o) Partition coefficient: n-octanol/water log Pow: 3.11
- p) Auto-ignition temperature no data available
- q) Decomposition temperature no data available
- r) Viscosity no data available
- s) Explosive properties no data available
- t) Oxidizing properties no data available

## 9.2 Other safety information

no data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

no data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

no data available

### 10.4 Conditions to avoid

Heat, flames and sparks.

### 10.5 Incompatible materials

Strong oxidizing agents, Magnesium

### 10.6 Hazardous decomposition products

Other decomposition products - no data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - rat - 170.0 mg/kg

LC50 Inhalation - rat - 8 h - 103 ppm

LD50 Dermal - rabbit - 1,400 mg/kg

no data available

#### Skin corrosion/irritation

Skin - rabbit

Result: Severe skin irritation

#### Serious eye damage/eye irritation

Eyes - rabbit

Result: Mild eye irritation



**Respiratory or skin sensitisation**

no data available

**Germ cell mutagenicity**

May alter genetic material.

In vivo tests showed mutagenic effects

**Carcinogenicity**

This product is or contains a component that has been reported to be probably carcinogenic based on its IARC, OSHA, ACGIH, NTP, or EPA classification.

Possible human carcinogen

IARC: 2B - Group 2B: Possibly carcinogenic to humans (1,2-Dibromo-3-chloropropane)

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: Reasonably anticipated to be a human carcinogen (1,2-Dibromo-3-chloropropane)

OSHA: OSHA specifically regulated carcinogen (1,2-Dibromo-3-chloropropane)

**Reproductive toxicity**

Known human reproductive toxicant

May cause reproductive disorders.

**Specific target organ toxicity - single exposure**

no data available

**Specific target organ toxicity - repeated exposure**

May cause damage to organs through prolonged or repeated exposure.

**Aspiration hazard**

no data available

**Additional Information**

RTECS: TX8750000

Depending on the intensity and duration of exposure, effects may vary from mild irritation to severe destruction of tissue., Central nervous system depression, Gastrointestinal disturbance, Damage to the eyes., Liver injury may occur., Kidney injury may occur.

Kidney -

---

**12. ECOLOGICAL INFORMATION****12.1 Toxicity**

Toxicity to fish LC50 - other fish - 20 mg/l - 48.0 h

**12.2 Persistence and degradability**

no data available

**12.3 Bioaccumulative potential**

no data available

**12.4 Mobility in soil**

no data available

**12.5 Results of PBT and vPvB assessment**

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

**12.6 Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.  
Harmful to aquatic life.

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

#### Product

This combustible material may be burned in a chemical incinerator equipped with an afterburner and scrubber. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

### DOT (US)

UN number: 2872      Class: 6.1      Packing group: III  
Proper shipping name: Dibromochloropropane  
Reportable Quantity (RQ): 1 lbs  
Marine pollutant: No  
Poison Inhalation Hazard: No

### IMDG

UN number: 2872      Class: 6.1      Packing group: III      EMS-No: F-A, S-A  
Proper shipping name: DIBROMOCHLOROPROPANES  
Marine pollutant: No

### IATA

UN number: 2872      Class: 6.1      Packing group: III  
Proper shipping name: Dibromochloropropanes

---

## 15. REGULATORY INFORMATION

REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

### SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

### Massachusetts Right To Know Components

	CAS-No.	Revision Date
1,2-Dibromo-3-chloropropane	96-12-8	2007-07-01

### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
1,2-Dibromo-3-chloropropane	96-12-8	2007-07-01

### New Jersey Right To Know Components

	CAS-No.	Revision Date
1,2-Dibromo-3-chloropropane	96-12-8	2007-07-01

### California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer.	96-12-8	2009-02-01
1,2-Dibromo-3-chloropropane		

	CAS-No.	Revision Date
WARNING: This product contains a chemical known to the		

---

## 16. OTHER INFORMATION

### Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Aquatic Acute	Acute aquatic toxicity
Aquatic Chronic	Chronic aquatic toxicity
Carc.	Carcinogenicity
Flam. Liq.	Flammable liquids
H227	Combustible liquid
H301	Toxic if swallowed.
H340	May cause genetic defects.
H350	May cause cancer.
H360	May damage fertility or the unborn child.
H373	May cause damage to organs through prolonged or repeated exposure.

### HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	2
Physical Hazard	0

### NFPA Rating

Health hazard:	4
Fire Hazard:	2
Reactivity Hazard:	0

### Further information

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://www.sigma-aldrich.com) and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

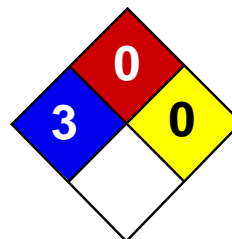
### Preparation Information

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 5.1

Revision Date: 04/05/2014

Print Date: 05/30/2014



Health	3
Fire	0
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### 1,2-Dibromoethane MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** 1,2-Dibromoethane

**Catalog Codes:** SLD1783

**CAS#:** 106-93-4

**RTECS:** KH9275000

**TSCA:** TSCA 8(b) inventory: 1,2-Dibromoethane

**CI#:** Not available.

**Synonym:** Ethylene Dibromide

**Chemical Formula:** C<sub>2</sub>H<sub>4</sub>Br<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
{1,2-}Dibromoethane	106-93-4	100

**Toxicological Data on Ingredients:** 1,2-Dibromoethane: ORAL (LD50): Acute: 108 mg/kg [Rat]. DERMAL (LD50): Acute: 300 mg/kg [Rabbit]. VAPOR (LC50): Acute: 7150 ppm 4 hour(s) [Rat].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Very hazardous in case of eye contact (irritant), of ingestion. Hazardous in case of skin contact (irritant, permeator), of inhalation. Severe over-exposure can result in death. Inflammation of the eye is characterized by redness, watering, and itching.

##### Potential Chronic Health Effects:

**CARCINOGENIC EFFECTS:** Classified + (PROVEN) by OSHA. Classified A2 (Suspected for human.) by ACGIH, 2A (Probable for human.) by IARC. **MUTAGENIC EFFECTS:** Not available. **TERATOGENIC EFFECTS:** Not available. **DEVELOPMENTAL TOXICITY:** PROVEN The substance is toxic to kidneys, the reproductive system, liver, upper respiratory tract. 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:**

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:** 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:**

Keep locked up 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 Keep away from incompatibles such as reducing agents.

**Storage:**

Keep container tightly closed. Keep in a cool, well-ventilated place. Highly toxic or infectious materials should be stored in a separate locked safety storage cabinet or room.

## 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: 20 CEIL: 30 (ppm) TWA: 155 CEIL: 230 (mg/m<sup>3</sup>) Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Chloroform. (Strong.)

**Taste:** Not available.

**Molecular Weight:** 187.87 g/mole

**Color:** Clear Colorless.

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

**Boiling Point:** 131.4°C (268.5°F)

**Melting Point:** 9.3°C (48.7°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 2.18 (Water = 1)

**Vapor Pressure:** 11 mm of Hg (@ 20°C)

**Vapor Density:** 6.48 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 10 ppm

**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:** Highly reactive with reducing agents.

**Corrosivity:**

Extremely corrosive in presence of aluminum. 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): 108 mg/kg [Rat]. Acute dermal toxicity (LD50): 300 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 7150 ppm 4 hour(s) [Rat].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified A2 (Suspected for human.) by ACGIH, 2A (Probable for human.) by IARC. DEVELOPMENTAL TOXICITY: PROVEN The substance is toxic to kidneys, the reproductive system, liver, upper respiratory tract.

**Other Toxic Effects on Humans:**

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

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Animal: embryotoxic, induces sterility; decrease of sperm count.

**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 6.1: Poisonous material.

**Identification:** : Ethylene dibromide : UN1605 PG: I

**Special Provisions for Transport:** Marine Pollutant, Poison inhalation hazard zone B

## 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: 1,2-Dibromoethane 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: 1,2-Dibromoethane Pennsylvania RTK: 1,2-Dibromoethane Florida: 1,2-Dibromoethane Minnesota: 1,2-Dibromoethane Massachusetts RTK: 1,2-Dibromoethane New Jersey: 1,2-Dibromoethane TSCA 8(b) inventory: 1,2-Dibromoethane SARA 313 toxic chemical notification and release reporting: 1,2-Dibromoethane CERCLA: Hazardous substances.: 1,2-Dibromoethane

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

### Other Classifications:

#### WHMIS (Canada):

CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

#### DSCL (EEC):

R24/25- Toxic in contact with skin and if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer.

#### HMIS (U.S.A.):

**Health Hazard:** 3

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 3

**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. Splash goggles.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/09/2005 05:07 PM

**Last Updated:** 05/21/2013 12:00 PM

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## Material Safety Data Sheet

Version 4.6

Revision Date 11/16/2012

Print Date 05/28/2014

## 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : *trans*-1,2-Dichloroethene

Product Number : 48527

Brand : Supelco

Supplier : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

Preparation Information : Sigma-Aldrich Corporation  
Product Safety - Americas Region  
1-800-521-8956

## 2. HAZARDS IDENTIFICATION

## Emergency Overview

## OSHA Hazards

Flammable liquid

## Target Organs

Central nervous system, Liver, Kidney

## GHS Classification

Flammable liquids (Category 2)

Acute toxicity, Oral (Category 4)

Acute toxicity, Inhalation (Category 4)

Skin irritation (Category 2)

Eye irritation (Category 2A)

Acute aquatic toxicity (Category 3)

## GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H225

Highly flammable liquid and vapour.

H302 + H332

Harmful if swallowed or if inhaled

H315

Causes skin irritation.

H319

Causes serious eye irritation.

H402

Harmful to aquatic life.

Precautionary statement(s)

P210

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P305 + P351 + P338

IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

## HMIS Classification

Health hazard: 2  
Chronic Health Hazard: \*  
Flammability: 3  
Physical hazards: 0

**NFPA Rating**

Health hazard: 2  
Fire: 3  
Reactivity Hazard: 0

**Potential Health Effects**

**Inhalation** May be harmful if inhaled. Causes respiratory tract irritation.  
**Skin** Harmful if absorbed through skin. Causes skin irritation.  
**Eyes** Causes eye irritation.  
**Ingestion** Harmful if swallowed.

---

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Synonyms : trans-1,2-Dichloroethene  
trans-1,2-Dichloroethylene  
trans-Acetylene dichloride

Formula : C<sub>2</sub>H<sub>2</sub>Cl<sub>2</sub>  
Molecular Weight : 96.94 g/mol

Component		Concentration
<b>trans-Dichloroethylene</b>		
CAS-No.	156-60-5	-
EC-No.	205-860-2	
Index-No.	602-026-00-3	

---

**4. FIRST AID MEASURES**

**General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**

Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

---

**5. FIREFIGHTING MEASURES**

**Conditions of flammability**

Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

**Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for firefighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**

Hazardous decomposition products formed under fire conditions. - Hydrogen chloride gas, Carbon oxides, Phosgene gas  
Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

**Further information**

Use water spray to cool unopened containers.

---

**6. ACCIDENTAL RELEASE MEASURES****Personal precautions**

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

**Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

---

**7. HANDLING AND STORAGE****Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

**Conditions for safe storage**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

---

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Components with workplace control parameters**

Components	CAS-No.	Value	Control parameters	Basis
trans-Dichloroethylene	156-60-5	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Central Nervous System impairment Eye irritation			

**Personal protective equipment****Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Eye protection**

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****Appearance**

Form	liquid, clear
Colour	light yellow

**Safety data**

pH	no data available
Melting point/freezing point	Melting point/range: -50 °C (-58 °F) - lit.
Boiling point	48 °C (118 °F) - lit.
Flash point	6.0 °C (42.8 °F) - closed cup
Ignition temperature	no data available
Autoignition temperature	no data available
Lower explosion limit	9.7 %(V)
Upper explosion limit	12.8 %(V)
Vapour pressure	no data available
Density	1.257 g/cm <sup>3</sup> at 25 °C (77 °F)
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapour density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

---

**10. STABILITY AND REACTIVITY****Chemical stability**

Stable under recommended storage conditions.

**Possibility of hazardous reactions**

Vapours may form explosive mixture with air.

**Conditions to avoid**

Heat, flames and sparks. Extremes of temperature and direct sunlight.

**Materials to avoid**

Oxidizing agents, Bases

**Hazardous decomposition products**

Hazardous decomposition products formed under fire conditions. - Hydrogen chloride gas, Carbon oxides, Phosgene gas

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Other decomposition products - no data available

---

**11. TOXICOLOGICAL INFORMATION**

## Acute toxicity

### Oral LD50

LD50 Oral - rat - 1,235 mg/kg

LD50 Oral - mouse - 2,122 mg/kg

Remarks: Behavioral:Altered sleep time (including change in righting reflex). Behavioral:Somnolence (general depressed activity). Behavioral:Ataxia.

### Inhalation LC50

LC50 Inhalation - rat - 24100 ppm

Remarks: Behavioral:Somnolence (general depressed activity).

### Dermal LD50

LD50 Dermal - rabbit - > 5,000 mg/kg

Remarks: Prolonged skin contact may cause skin irritation and/or dermatitis. Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

### Other information on acute toxicity

no data available

## Skin corrosion/irritation

Skin - rabbit - Skin irritation - 24 h

## Serious eye damage/eye irritation

Eyes - rabbit - Eye irritation

## Respiratory or skin sensitization

no data available

## Germ cell mutagenicity

no data available

## Carcinogenicity

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

## Reproductive toxicity

no data available

## Teratogenicity

no data available

## Specific target organ toxicity - single exposure (Globally Harmonized System)

no data available

## Specific target organ toxicity - repeated exposure (Globally Harmonized System)

no data available

## Aspiration hazard

no data available

## Potential health effects

### Inhalation

May be harmful if inhaled. Causes respiratory tract irritation.

### Ingestion

Harmful if swallowed.

**Skin**  
**Eyes**

Harmful if absorbed through skin. Causes skin irritation.  
Causes eye irritation.

**Signs and Symptoms of Exposure**

prolonged or repeated exposure can cause:., narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Synergistic effects**

no data available

**Additional Information**

RTECS: Not available

---

**12. ECOLOGICAL INFORMATION**

**Toxicity**

Toxicity to daphnia and other aquatic invertebrates      EC50 - Daphnia magna (Water flea) - 220.00 mg/l - 48 h

**Persistence and degradability**

no data available

**Bioaccumulative potential**

no data available

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic life.

---

**13. DISPOSAL CONSIDERATIONS**

**Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION**

**DOT (US)**

UN number: 1150    Class: 3    Packing group: II

Proper shipping name: 1,2-Dichloroethylene

Reportable Quantity (RQ): 1000 lbs

Marine pollutant: No

Poison Inhalation Hazard: No

**IMDG**

UN number: 1150    Class: 3    Packing group: II

EMS-No: F-E, S-D

Proper shipping name: 1,2-DICHLOROETHYLENE

Marine pollutant: No

**IATA**

UN number: 1150    Class: 3    Packing group: II

Proper shipping name: 1,2-Dichloroethylene

---

**15. REGULATORY INFORMATION**

**OSHA Hazards**  
Flammable liquid

**SARA 302 Components**

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**

Fire Hazard

**Massachusetts Right To Know Components**

trans-Dichloroethylene	CAS-No. 156-60-5	Revision Date 1993-04-24
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**Pennsylvania Right To Know Components**

trans-Dichloroethylene	CAS-No. 156-60-5	Revision Date 1993-04-24
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**New Jersey Right To Know Components**

trans-Dichloroethylene	CAS-No. 156-60-5	Revision Date 1993-04-24
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**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

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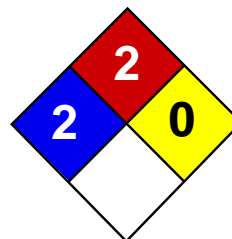
**16. OTHER INFORMATION**

**Further information**

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Health	2
Fire	2
Reactivity	0
Personal Protection	E

## Material Safety Data Sheet

### 1,4-Dichlorobenzene MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** 1,4-Dichlorobenzene

**Catalog Codes:** SLD4093

**CAS#:** 106-46-7

**RTECS:** CZ4550000

**TSCA:** TSCA 8(b) inventory: 1,4-Dichlorobenzene

**CI#:** Not available.

**Synonym:**

**Chemical Formula:** C<sub>6</sub>H<sub>4</sub>Cl<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
{1,4-}Dichlorobenzene	106-46-7	100

**Toxicological Data on Ingredients:** 1,4-Dichlorobenzene: ORAL (LD50): Acute: 500 mg/kg [Rat]. DERMAL (LD50): Acute: 6000 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 (irritant, permeator), of eye contact (irritant), of ingestion, of inhalation. CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2 (Reasonably anticipated.) by NTP. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, liver, mucous membranes. Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of dust 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. 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:** 413°C (775.4°F)

**Flash Points:** CLOSED CUP: 65.56°C (150°F). (TAG)

**Flammable Limits:** LOWER: 2.5% UPPER: 16%

**Products of Combustion:** These products are carbon oxides (CO, CO<sub>2</sub>), halogenated compounds.

**Fire Hazards in Presence of Various Substances:** Slightly flammable to flammable in presence of oxidizing materials.

**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 to explosive in presence of oxidizing materials.

**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. 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. 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. 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. Carcinogenic, teratogenic or mutagenic materials should be stored in a separate locked safety storage cabinet or room.

## 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:**

TWA: 75 CEIL: 110 (ppm) TWA: 450 CEIL: 675 (mg/m3) Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Solid.

**Odor:** Not available.

**Taste:** Not available.

**Molecular Weight:** 147 g/mole

**Color:** Not available.

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

**Boiling Point:** 174.12°C (345.4°F)

**Melting Point:** 53.75°C (128.8°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.46 (Water = 1)

**Vapor Pressure:** Not applicable.

**Vapor Density:** 5.08 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 15 ppm

**Water/Oil Dist. Coeff.:** The product is equally soluble in oil and water; log(oil/water) = 0

**Ionicity (in Water):** Not available.

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

**Solubility:**

Soluble in methanol, 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:** 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): 500 mg/kg [Rat]. Acute dermal toxicity (LD50): 6000 mg/kg [Rabbit].

**Chronic Effects on Humans:**

CARCINOGENIC EFFECTS: Classified A3 (Proven for animal.) by ACGIH. Classified 2 (Reasonably anticipated.) by NTP. The substance is toxic to kidneys, lungs, liver, 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 9: Miscellaneous hazardous material.

**Identification:** : Environmentally hazardous substance, solid, n.o.s. (p-Dichlorobenzene) : UN3077 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: 1,4-Dichlorobenzene 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: 1,4-Dichlorobenzene Pennsylvania RTK: 1,4-Dichlorobenzene Massachusetts RTK: 1,4-Dichlorobenzene TSCA 8(b) inventory: 1,4-Dichlorobenzene SARA 313 toxic chemical notification and release reporting: 1,4-Dichlorobenzene CERCLA: Hazardous substances.: 1,4-Dichlorobenzene

**Other Regulations:** OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

### 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):

R38- Irritating to skin. R41- Risk of serious damage to eyes. R45- May cause cancer.

#### 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.

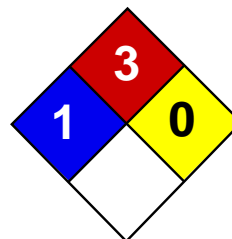
**Other Special Considerations:** Not available.

**Created:** 10/09/2005 05:07 PM

**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 ethyl ketone MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Methyl ethyl ketone

**Catalog Codes:** SLM2626, SLM3232

**CAS#:** 78-93-3

**RTECS:** EL6475000

**TSCA:** TSCA 8(b) inventory: Methyl ethyl ketone

**CI#:** Not applicable.

**Synonym:** 2-Butanone

**Chemical Name:** Methyl Ethyl Ketone

**Chemical Formula:** C<sub>4</sub>H<sub>8</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 ethyl ketone	78-93-3	100

**Toxicological Data on Ingredients:** Methyl ethyl ketone: ORAL (LD50): Acute: 2737 mg/kg [Rat]. 4050 mg/kg [Mouse]. DERMAL (LD50): Acute: 6480 mg/kg [Rabbit]. VAPOR (LC50): Acute: 23500 mg/m 8 hours [Rat].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

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

##### Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to gastrointestinal tract, upper respiratory tract, skin, eyes, 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. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. 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. Cold water may be used. 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.

**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:** 404°C (759.2°F)

**Flash Points:** CLOSED CUP: -9°C (15.8°F). OPEN CUP: -5.5556°C (22°F) (Tag).

**Flammable Limits:** LOWER: 1.8% UPPER: 10%

**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.

**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:**

Ignition on contact with potassium t-butoxide. Vapor may cause a flash fire

**Special Remarks on Explosion Hazards:**

Reaction with Hydrogen Peroxide + nitric acid forms heat and shock-sensitive explosive product. Mixture with 2-propanol will produce explosive peroxides during storage.

## 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. 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. 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, metals, acids, alkalis.

### 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: 300 (ppm) from ACGIH (TLV) [United States] [1999] TWA: 150 STEL: 300 (ppm) [Australia] TWA: 590 STEL: 885 (mg/m3) from NIOSH TWA: 200 STEL: 300 (ppm) from NIOSH TWA: 590 STEL: 885 (mg/m3) [Canada] TWA: 200 STEL: 300 (ppm) from OSHA (PEL) [United States] TWA: 590 STEL: 885 (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:

Acetone-like Pleasant. Pungent. Sweetish. (Strong.)

**Taste:** Not available.

**Molecular Weight:** 72.12g/mole

**Color:** Clear Colorless.

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

**Boiling Point:** 79.6 (175.3°F)

**Melting Point:** -86°C (-122.8°F)

**Critical Temperature:** 262.5°C (504.5°F)

**Specific Gravity:** 0.805(Water = 1)

**Vapor Pressure:** 10.3 kPa (@ 20°C)

**Vapor Density:** 2.41 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 0.25 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil;  $\log(\text{oil/water}) = 0.3$

**Ionicity (in Water):** Not available.

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

**Solubility:** Soluble in cold water, diethyl ether, acetone.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Heat, ignition sources, mechanical shock, incompatible materials.

**Incompatibility with various substances:** Reactive with oxidizing agents, metals, acids, alkalis.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:**

Incompatible with chloroform, copper, hydrogen peroxide, nitric acid, potassium t-butoxide, 2-propanol, chlorosulfonic acid, strong oxidizers, amines, ammonia, inorganic acids, isocyanates, caustics, pyridines. Vigorous reaction with chloroform +alkali.

**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): 2737 mg/kg [Rat]. Acute dermal toxicity (LD50): 6480 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 32000 mg/m<sup>3</sup> 4 hours [Mouse].

**Chronic Effects on Humans:**

MUTAGENIC EFFECTS: Mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Classified POSSIBLE for human. May cause damage to the following organs: gastrointestinal tract, upper respiratory tract, skin, eyes, central nervous system (CNS).

**Other Toxic Effects on Humans:** Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation (lung irritant).

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** May cause birth defects based on animal data. Embryotoxic and/or foetotoxic in animal.

**Special Remarks on other Toxic Effects on Humans:**

Acute Potential Health Effects: Skin: Causes skin irritation. May be absorbed through the skin. Eyes: Causes eye irritation. Inhalation: Inhalation of high concentrations may cause central nervous effects characterized by headache, dizziness, unconsciousness, and coma. Causes respiratory tract irritation and affects the sense organs. May affect the liver and urinary system. Ingestion: Causes gastrointestinal tract irritation with nausea, vomiting and diarrhea. May affect the liver. Chronic Potential Health Effects: Chronic inhalation may cause effects similar to those of acute inhalation. Prolonged or repeated skin contact may cause defatting and dermatitis.

## Section 12: Ecological Information

**Ecotoxicity:** Ecotoxicity in water (LC50): 3220 mg/l 96 hours [Fathead Minnow]. 1690 mg/l 96 hours [Bluegill].

**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 3: Flammable liquid.

**Identification:** : Ethyl methyl ketone UNNA: 1193 PG: II

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

**Federal and State Regulations:**

New York release reporting list: Methyl ethyl ketone Rhode Island RTK hazardous substances: Methyl ethyl ketone Pennsylvania RTK: Methyl ethyl ketone Minnesota: Methyl ethyl ketone Massachusetts RTK: Methyl ethyl ketone New Jersey: Methyl ethyl ketone California Director's list of Hazardous Substances: Methyl ethyl ketone TSCA 8(b) inventory: Methyl ethyl ketone TSCA 8(d) H and S data reporting: Methyl ethyl ketone: Effective: 10/4/82; Sunset: 10/4/92 SARA 313 toxic chemical notification and release reporting: Methyl ethyl ketone CERCLA: Hazardous substances.: Methyl ethyl ketone: 5000 lbs. (2268 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. R36/37- Irritating to eyes and respiratory system. S9- Keep container in a well-ventilated place. S16- Keep away from sources of ignition - No smoking. S25- Avoid contact with eyes. 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:** 1

**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**

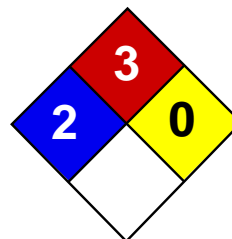
**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:39 PM

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### 2-Hexanone MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** 2-Hexanone

**Catalog Codes:** SLH2950

**CAS#:** 591-78-6

**RTECS:** MP1400000

**TSCA:** TSCA 8(b) inventory: 2-Hexanone

**CI#:** Not available.

**Synonym:** Methyl butyl ketone

**Chemical Formula:** C<sub>6</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
{2-}Hexanone	591-78-6	100

**Toxicological Data on Ingredients:** 2-Hexanone: ORAL (LD50): Acute: 2590 mg/kg [Rat]. 2430 mg/kg [Mouse]. DERMAL (LD50): Acute: 4860 mg/kg [Rabbit]. VAPOR (LC50): Acute: 8000 ppm 4 hour(s) [Rat].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

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

##### 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. 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:** 533°C (991.4°F)

**Flash Points:** CLOSED CUP: 23°C (73.4°F). OPEN CUP: 28°C (82.4°F) (TAG).

**Flammable Limits:** LOWER: 1.2% UPPER: 8%

**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:**

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. 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: 25 CEIL: 40 (ppm) TWA: 100 CEIL: 165 (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:** 100.16 g/mole

**Color:** Colorless to light yellow.

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

**Boiling Point:** 127.5°C (261.5°F)

**Melting Point:** -56.9°C (-70.4°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 0.8113 (Water = 1)

**Vapor Pressure:** 12 mm of Hg (@ 20°C)

**Vapor Density:** 3.45 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 0.18 ppm

**Water/Oil Dist. Coeff.:** The product is equally soluble in oil and water; log(oil/water) = 0

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water, acetone.

**Solubility:**

Easily soluble in acetone. 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:** 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): 2430 mg/kg [Mouse]. Acute dermal toxicity (LD50): 4860 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 8000 ppm 4 hour(s) [Rat].

**Chronic Effects on Humans:** Not available.

**Other Toxic Effects on Humans:**

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

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:** Passes through the placental barrier in animal. Testicular damage in animal.

**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:** : Ketone Liquid, n.o.s.(2-Hexanone) : UN1224 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Rhode Island RTK hazardous substances: 2-Hexanone Pennsylvania RTK: 2-Hexanone Florida: 2-Hexanone Massachusetts RTK: 2-Hexanone New Jersey: 2-Hexanone TSCA 8(b) inventory: 2-Hexanone

### 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).

### DSCL (EEC):

R10- Flammable. R37/38- Irritating to respiratory system and 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:** 10/09/2005 05:43 PM

**Last Updated:** 05/21/2013 12:00 PM

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## Material Safety Data Sheet

Version 5.3

Revision Date 06/04/2013

Print Date 05/30/2014

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1. PRODUCT AND COMPANY IDENTIFICATION

Product name : 4-Methyl-2-pentanone

Product Number : 360511

Brand : Sigma-Aldrich

Supplier : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

Preparation Information : Sigma-Aldrich Corporation  
Product Safety - Americas Region  
1-800-521-8956

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2. HAZARDS IDENTIFICATION

## Emergency Overview

## OSHA Hazards

Flammable liquid, Carcinogen, Target Organ Effect, Irritant

## Target Organs

Nerves.

## Other hazards which do not result in classification

May form explosive peroxides.

## GHS Classification

Flammable liquids (Category 2)

Acute toxicity, Oral (Category 5)

Acute toxicity, Inhalation (Category 4)

Skin irritation (Category 3)

Eye irritation (Category 2A)

Specific target organ toxicity - single exposure (Category 3), Respiratory system

## GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H225 Highly flammable liquid and vapour.

H303 May be harmful if swallowed.

H316 Causes mild skin irritation.

H319 Causes serious eye irritation.

H332 Harmful if inhaled.

H335 May cause respiratory irritation.

Precautionary statement(s)

P210 Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

P261  
P305 + P351 + P338

Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.  
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.

#### Other hazards

Repeated exposure may cause skin dryness or cracking.

#### HMIS Classification

Health hazard: 2  
Chronic Health Hazard: \*  
Flammability: 3  
Physical hazards: 0

#### NFPA Rating

Health hazard: 2  
Fire: 3  
Reactivity Hazard: 0

#### Potential Health Effects

**Inhalation** May be harmful if inhaled. Causes respiratory tract irritation.  
**Skin** May be harmful if absorbed through skin. Causes skin irritation.  
**Eyes** Causes eye irritation.  
**Ingestion** May be harmful if swallowed.

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Synonyms : Isobutyl methyl ketone  
Methyl isobutyl ketone  
Isopropylacetone

Formula : C<sub>6</sub>H<sub>12</sub>O  
Molecular Weight : 100.16 g/mol

Component		Concentration
<b>4-Methylpentan-2-one</b>		
CAS-No.	108-10-1	90 100 %
EC-No.	203-550-1	
Index-No.	606-004-00-4	

---

### 4. FIRST AID MEASURES

#### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

---

### 5. FIREFIGHTING MEASURES

#### Conditions of flammability

Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for firefighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides

**Further information**

Use water spray to cool unopened containers.

**6. ACCIDENTAL RELEASE MEASURES****Personal precautions**

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

**Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

**Methods and materials for containment and cleaning up**

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

**7. HANDLING AND STORAGE****Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

**Conditions for safe storage**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Components with workplace control parameters**

Components	CAS-No.	Value	Control parameters	Basis
4-Methylpentan-2-one	108-10-1	TWA	50 ppm 205 mg/m <sup>3</sup>	USA. ACGIH Threshold Limit Values (TLV)
		STEL	75 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Upper Respiratory Tract irritation Headache Dizziness 2010 Adoption Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans			
		TWA	50 ppm 205 mg/m <sup>3</sup>	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		STEL	75 ppm 300 mg/m <sup>3</sup>	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	100 ppm 410 mg/m <sup>3</sup>	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m <sup>3</sup> is approximate.			
		TWA	20 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Upper Respiratory Tract irritation Headache Dizziness 2010 Adoption Substances for which there is a Biological Exposure Index or Indices (see BEI® section) Confirmed animal carcinogen with unknown relevance to humans			
		TWA	50 ppm	USA. NIOSH Recommended Exposure Limits

			205 mg/m <sup>3</sup>	
		ST	75 ppm 300 mg/m <sup>3</sup>	USA. NIOSH Recommended Exposure Limits

## Personal protective equipment

### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### Hand protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Splash contact

Material: butyl-rubber

Minimum layer thickness: 0.3 mm

Break through time: 212 min

Material tested: Butoject® (KCL 897 / Aldrich Z677647, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374  
If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

### Eye protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

### Skin and body protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

### Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	liquid
Colour	no data available

### Safety data

pH	no data available
Melting point/freezing point	Melting point/range: -80 °C (-112 °F) - lit.
Boiling point	117 - 118 °C (243 - 244 °F)
Flash point	14 °C (57 °F) - closed cup
Ignition temperature	459 °C (858 °F)
Auto-ignition temperature	no data available
Lower explosion limit	1.2 %(V)
Upper explosion limit	8 %(V)
Vapour pressure	20 hPa (15 mmHg) at 20 °C (68 °F)

Density	0.801 g/cm <sup>3</sup> at 25 °C (77 °F)
Water solubility	ca.20 g/l
Partition coefficient: n-octanol/water	log Pow: 1.31
Relative vapour density	3.46 - (Air = 1.0)
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

---

## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### Conditions to avoid

Heat, flames and sparks. Extremes of temperature and direct sunlight.

### Materials to avoid

Oxidizing agents, Strong bases

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides  
Other decomposition products - no data available

---

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 2,080 mg/kg

#### Inhalation LC50

LC50 Inhalation - rat - 4 h - 8.2 - 16.4 mg/m<sup>3</sup>

#### Dermal LD50

LD50 Dermal - rabbit - > 16,000 mg/kg

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

Skin - rabbit - Mild skin irritation - 24 h

### Serious eye damage/eye irritation

Eyes - rabbit - Moderate eye irritation - 24 h

### Respiratory or skin sensitisation

no data available

### Germ cell mutagenicity

no data available

### Carcinogenicity

IARC: 2B - Group 2B: Possibly carcinogenic to humans (4-Methylpentan-2-one)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a

carcinogen or potential carcinogen by OSHA.

### Reproductive toxicity

no data available

### Teratogenicity

Developmental Toxicity - mouse - Inhalation

Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus). Effects on Embryo or Fetus: Fetal death.

Developmental Toxicity - mouse - Inhalation

Specific Developmental Abnormalities: Central nervous system. Specific Developmental Abnormalities: Musculoskeletal system. Specific Developmental Abnormalities: Cardiovascular (circulatory) system.

no data available

### Specific target organ toxicity - single exposure (Globally Harmonized System)

May cause respiratory irritation.

### Specific target organ toxicity - repeated exposure (Globally Harmonized System)

no data available

### Aspiration hazard

no data available

### Potential health effects

Inhalation	May be harmful if inhaled. Causes respiratory tract irritation.
Ingestion	May be harmful if swallowed.
Skin	May be harmful if absorbed through skin. Causes skin irritation.
Eyes	Causes eye irritation.

### Signs and Symptoms of Exposure

Blurred vision, Dermatitis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

### Synergistic effects

no data available

### Additional Information

RTECS: SA9275000

---

## 12. ECOLOGICAL INFORMATION

### Toxicity

Toxicity to fish	LC0 - Leuciscus idus melanotus - 480 mg/l - 48 h
Toxicity to daphnia and other aquatic invertebrates	EC50 - Daphnia magna (Water flea) - 1,550 - 3,623 mg/l - 24 h
Toxicity to algae	EC50 - Desmodesmus subspicatus (green algae) - 980 - 2,000 mg/l - 48 h

### Persistence and degradability

Biodegradability	Biotic/Aerobic
------------------	----------------

### Bioaccumulative potential

no data available

### Mobility in soil

no data available

### PBT and vPvB assessment

no data available

### Other adverse effects

no data available

---

### 13. DISPOSAL CONSIDERATIONS

#### Product

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

#### Contaminated packaging

Dispose of as unused product.

---

### 14. TRANSPORT INFORMATION

#### DOT (US)

UN number: 1245 Class: 3 Packing group: II  
Proper shipping name: Methyl isobutyl ketone  
Reportable Quantity (RQ): 5000 lbs  
Marine pollutant: No  
Poison Inhalation Hazard: No

#### IMDG

UN number: 1245 Class: 3 Packing group: II EMS-No: F-E, S-D  
Proper shipping name: METHYL ISOBUTYL KETONE  
Marine pollutant: No

#### IATA

UN number: 1245 Class: 3 Packing group: II  
Proper shipping name: Methyl isobutyl ketone

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### 15. REGULATORY INFORMATION

#### OSHA Hazards

Flammable liquid, Carcinogen, Target Organ Effect, Irritant

#### SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

#### SARA 313 Components

The following components are subject to reporting levels established by SARA Title III, Section 313:

	CAS-No.	Revision Date
4-Methylpentan-2-one	108-10-1	1993-04-24

#### SARA 311/312 Hazards

Fire Hazard, Acute Health Hazard, Chronic Health Hazard

#### Massachusetts Right To Know Components

	CAS-No.	Revision Date
4-Methylpentan-2-one	108-10-1	1993-04-24

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
4-Methylpentan-2-one	108-10-1	1993-04-24

#### New Jersey Right To Know Components

	CAS-No.	Revision Date
4-Methylpentan-2-one	108-10-1	1993-04-24

#### California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause cancer.	108-10-1	2011-11-18
4-Methylpentan-2-one		

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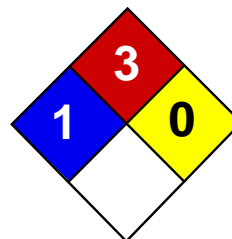
### 16. OTHER INFORMATION



**Further information**

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Acetone MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Acetone

**Catalog Codes:** SLA3502, SLA1645, SLA3151, SLA3808

**CAS#:** 67-64-1

**RTECS:** AL3150000

**TSCA:** TSCA 8(b) inventory: Acetone

**CI#:** Not applicable.

**Synonym:** 2-propanone; Dimethyl Ketone;  
Dimethylformaldehyde; Pyroacetic Acid

**Chemical Name:** Acetone

**Chemical Formula:** C<sub>3</sub>H<sub>6</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
Acetone	67-64-1	100

**Toxicological Data on Ingredients:** Acetone: ORAL (LD<sub>50</sub>): Acute: 5800 mg/kg [Rat]. 3000 mg/kg [Mouse]. 5340 mg/kg [Rabbit]. VAPOR (LC<sub>50</sub>): Acute: 50100 mg/m 8 hours [Rat]. 44000 mg/m 4 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. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED]. The substance is toxic to central nervous system (CNS). The substance may be toxic to kidneys, the reproductive system, liver, skin. 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. 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. Cold water may be used. 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:** Flammable.

**Auto-Ignition Temperature:** 465°C (869°F)

**Flash Points:** CLOSED CUP: -20°C (-4°F). OPEN CUP: -9°C (15.8°F) (Cleveland).

**Flammable Limits:** LOWER: 2.6% UPPER: 12.8%

**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.

**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 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:** Vapor may travel considerable distance to source of ignition and flash back.

**Special Remarks on Explosion Hazards:**

Forms explosive mixtures with hydrogen peroxide, acetic acid, nitric acid, nitric acid + sulfuric acid, chromic anhydride, chromyl chloride, nitrosyl chloride, hexachloromelamine, nitrosyl perchlorate, nitryl perchlorate, permonosulfuric acid, thiodiglycol + hydrogen peroxide, potassium ter-butoxide, sulfur dichloride, 1-methyl-1,3-butadiene, bromoform, carbon, air, chloroform, thitriazylperchlorate.

## 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. 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. 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, reducing agents, acids, alkalis.

**Storage:**

Store in a segregated and approved area (flammables area) . Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Keep away from direct sunlight and heat and 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: 500 STEL: 750 (ppm) from ACGIH (TLV) [United States] TWA: 750 STEL: 1000 (ppm) from OSHA (PEL) [United States] TWA: 500 STEL: 1000 [Australia] TWA: 1185 STEL: 2375 (mg/m3) [Australia] TWA: 750 STEL: 1500 (ppm) [United Kingdom (UK)] TWA: 1810 STEL: 3620 (mg/m3) [United Kingdom (UK)] TWA: 1800 STEL: 2400 from OSHA (PEL) [United States] Consult local authorities for acceptable exposure limits.

**Section 9: Physical and Chemical Properties**

**Physical state and appearance:** Liquid.

**Odor:** Fruity. Mint-like. Fragrant. Ethereal

**Taste:** Pungent, Sweetish

**Molecular Weight:** 58.08 g/mole

**Color:** Colorless. Clear

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

**Boiling Point:** 56.2°C (133.2°F)

**Melting Point:** -95.35 (-139.6°F)

**Critical Temperature:** 235°C (455°F)

**Specific Gravity:** 0.79 (Water = 1)

**Vapor Pressure:** 24 kPa (@ 20°C)

**Vapor Density:** 2 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 62 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in water;  $\log(\text{oil/water}) = -0.2$

**Ionicity (in Water):** Not available.

**Dispersion Properties:** See solubility in water.

**Solubility:** Easily soluble in cold water, hot water.

## Section 10: Stability and Reactivity Data

**Stability:** The product is stable.

**Instability Temperature:** Not available.

**Conditions of Instability:** Excess heat, ignition sources, exposure to moisture, air, or water, incompatible materials.

**Incompatibility with various substances:** Reactive with oxidizing agents, reducing agents, acids, alkalis.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Not available.

**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): 3000 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 44000 mg/m<sup>3</sup> 4 hours [Mouse].

### Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive system/toxin/male [SUSPECTED]. Causes damage to the following organs: central nervous system (CNS). May cause damage to the following organs: kidneys, the reproductive system, liver, skin.

### 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:** Not available.

### Special Remarks on Chronic Effects on Humans:

May affect genetic material (mutagenicity) based on studies with yeast (*S. cerevisiae*), bacteria, and hamster fibroblast cells. May cause reproductive effects (fertility) based upon animal studies. May contain trace amounts of benzene and formaldehyde which may cancer and birth defects. Human: passes the placental barrier.

### Special Remarks on other Toxic Effects on Humans:

Acute Potential Health Effects: Skin: May cause skin irritation. May be harmful if absorbed through the skin. Eyes: Causes eye irritation, characterized by a burning sensation, redness, tearing, inflammation, and possible corneal injury. Inhalation: Inhalation at high concentrations affects the sense organs, brain and causes respiratory tract irritation. It also may affect the Central Nervous System (behavior) characterized by dizziness, drowsiness, confusion, headache, muscle weakness, and possibly motor incoordination, speech abnormalities, narcotic effects and coma. Inhalation may also affect the gastrointestinal tract (nausea, vomiting). Ingestion: May cause irritation of the digestive (gastrointestinal) tract (nausea, vomiting). It may also

affect the Central Nervous System (behavior), characterized by depression, fatigue, excitement, stupor, coma, headache, altered sleep time, ataxia, tremors as well as the blood, liver, and urinary system (kidney, bladder, ureter) and endocrine system. May also have musculoskeletal effects. Chronic Potential Health Effects: Skin: May cause dermatitis. Eyes: Eye irritation.

## Section 12: Ecological Information

### Ecotoxicity:

Ecotoxicity in water (LC50): 5540 mg/l 96 hours [Trout]. 8300 mg/l 96 hours [Bluegill]. 7500 mg/l 96 hours [Fathead Minnow]. 0.1 ppm any hours [Water flea].

**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 3: Flammable liquid.

**Identification:** : Acetone UNNA: 1090 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 reproductive harm (male) which would require a warning under the statute: Benzene 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: Benzene 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, Formaldehyde Connecticut hazardous material survey.: Acetone Illinois toxic substances disclosure to employee act: Acetone Illinois chemical safety act: Acetone New York release reporting list: Acetone Rhode Island RTK hazardous substances: Acetone Pennsylvania RTK: Acetone Florida: Acetone Minnesota: Acetone Massachusetts RTK: Acetone Massachusetts spill list: Acetone New Jersey: Acetone New Jersey spill list: Acetone Louisiana spill reporting: Acetone California List of Hazardous Substances (8 CCR 339): Acetone TSCA 8(b) inventory: Acetone TSCA 4(a) final test rules: Acetone TSCA 8(a) IUR: Acetone

### 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-2B: Material causing other toxic effects (TOXIC).

**DSCL (EEC):**

R11- Highly flammable. R36- Irritating to eyes. S9- Keep container in a well-ventilated place. S16- Keep away from sources of ignition - No smoking. S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

**HMIS (U.S.A.):**

**Health Hazard:** 2

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 1

**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:**

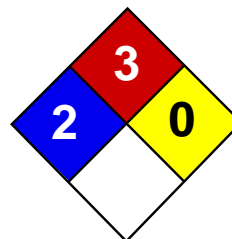
-Material safety data sheet issued by: la Commission de la Santé et de la Sécurité du Travail du Québec. -The Sigma-Aldrich Library of Chemical Safety Data, Edition II. -Hawley, G.G.. The Condensed Chemical Dictionary, 11e ed., New York N.Y., Van Nostrand Reinold, 1987. LOLI, RTECS, HSDB databases. Other MSDSs

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:13 PM

**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

### 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:** 05/21/2013 12:00 PM

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**Material Safety Data Sheet**

Version 3.1  
Revision Date 12/08/2009  
Print Date 07/15/2010

**1. PRODUCT AND COMPANY IDENTIFICATION**

Product name : Bromochloromethane

Product Number : 135267  
Brand : Aldrich

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +18003255832  
Fax : +18003255052  
Emergency Phone # : (314) 776-6555

**2. COMPOSITION/INFORMATION ON INGREDIENTS**

Formula : CH<sub>2</sub>BrCl

CAS-No.	EC-No.	Index-No.	Concentration
<b>Bromochloromethane</b>			
74-97-5	200-826-3	-	<= 100 %
<b>2,6-di-tert-Butyl-p-cresol</b>			
128-37-0	204-881-4	-	>= 0.0025 - <= 0.005 %

**3. HAZARDS IDENTIFICATION****Emergency Overview****OSHA Hazards**

Irritant

**HMIS Classification**

Health hazard: 2  
Flammability: 0  
Physical hazards: 0

**NFPA Rating**

Health hazard: 2  
Fire: 0  
Reactivity Hazard: 0

**Potential Health Effects**

**Inhalation** May be harmful if inhaled. Causes respiratory tract irritation.  
**Skin** May be harmful if absorbed through skin. Causes skin irritation.

**Eyes**  
**Ingestion**

Causes eye irritation.  
May be harmful if swallowed.

#### 4. FIRST AID MEASURES

**General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**

If breathed in, move person into fresh air. If not breathing give artificial respiration. Consult a physician.

**In case of skin contact**

Wash off with soap and plenty of water. Consult a physician.

**In case of eye contact**

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

#### 5. FIRE-FIGHTING MEASURES

**Flammable properties**

Flash point                      no data available

Ignition temperature      no data available

**Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for fire-fighters**

Wear self contained breathing apparatus for fire fighting if necessary.

#### 6. ACCIDENTAL RELEASE MEASURES

**Personal precautions**

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation.

**Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods for cleaning up**

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

#### 7. HANDLING AND STORAGE

**Handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Normal measures for preventive fire protection.

**Storage**

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Light sensitive.

#### 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

**Components with workplace control parameters**

Components	CAS-No.	Value	Control parameters	Update	Basis
Bromochloromethane	74-97-5	TWA	200 ppm	2007-01-01	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Central Nervous System impairment Liver damage				
		TWA	200 ppm 1,050 mg/m <sup>3</sup>	1989-01-19	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
		TWA	200 ppm 1,050 mg/m <sup>3</sup>	1997-08-04	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	The value in mg/m <sup>3</sup> is approximate.				

### Personal protective equipment

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Hand protection

Handle with gloves.

#### Eye protection

Safety glasses with side-shields conforming to EN166

#### Skin and body protection

Choose body protection according to the amount and concentration of the dangerous substance at the work place.

#### Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form liquid, clear

Colour light yellow

### Safety data

pH no data available

Melting point -88 °C (-126 °F) - lit.

Boiling point 68 °C (154 °F) - lit.

Flash point no data available

Ignition temperature no data available

Lower explosion limit no data available

Upper explosion limit no data available

Vapour pressure 156.0 hPa (117.0 mmHg) at 20.0 °C (68.0 °F)



Density	1.991 g/cm <sup>3</sup> at 25 °C (77 °F)
Water solubility	no data available

## 10. STABILITY AND REACTIVITY

### Storage stability

Stable under recommended storage conditions.

### Materials to avoid

Aluminum, Calcium, Magnesium, Zinc, Strong bases, Strong oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Hydrogen chloride gas, Hydrogen bromide gas

### Contains the following stabiliser(s):

BHT (>=0.0025 - <=0.005 %)

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

LD50 Oral - rat - 5,000 mg/kg

LC50 Inhalation - mouse - 7 h - 12,030 mg/m<sup>3</sup>

Remarks: Behavioral:General anesthetic. Behavioral:Muscle weakness. Lungs, Thorax, or Respiration:Dyspnea.

LD50 Dermal - rabbit - > 20,000 mg/kg

### Irritation and corrosion

no data available

### Sensitisation

no data available

### Chronic exposure

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

### Signs and Symptoms of Exposure

prolonged or repeated exposure can cause:, Nausea, Dizziness, Headache, narcosis, Cough, chest pain, Difficulty in breathing

### Potential Health Effects

<b>Inhalation</b>	May be harmful if inhaled. Causes respiratory tract irritation.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	Causes eye irritation.
<b>Ingestion</b>	May be harmful if swallowed.

### Additional Information

RTECS: PA5250000

## 12. ECOLOGICAL INFORMATION

### Elimination information (persistence and degradability)

no data available

### Ecotoxicity effects

Toxicity to fish LC50 - Cyprinus carpio (Carp) - 67 mg/l - 5 d

### Further information on ecology

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Dangerous for the ozone layer.

## 13. DISPOSAL CONSIDERATIONS

### Product

Observe all federal, state, and local environmental regulations. Contact a licensed professional waste disposal service to dispose of this material.

### Contaminated packaging

Dispose of as unused product.

## 14. TRANSPORT INFORMATION

### DOT (US)

UN-Number: 1887 Class: 6.1 Packing group: III

Proper shipping name: Bromochloromethane

Marine pollutant: No

Poison Inhalation Hazard: No

### IMDG

UN-Number: 1887 Class: 6.1 Packing group: III EMS-No: F-A, S-A

Proper shipping name: BROMOCHLOROMETHANE

Marine pollutant: No

### IATA

UN-Number: 1887 Class: 6.1 Packing group: III

Proper shipping name: Bromochloromethane

## 15. REGULATORY INFORMATION

### OSHA Hazards

Irritant

### DSL Status

All components of this product are on the Canadian DSL list.

### SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

### SARA 313 Components

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

### SARA 311/312 Hazards

Acute Health Hazard

### Massachusetts Right To Know Components

CAS-No.

Revision Date

Bromochloromethane

74-97-5

2007-03-01

**Pennsylvania Right To Know Components**

Bromochloromethane

CAS-No.  
74-97-5

Revision Date  
2007-03-01

**New Jersey Right To Know Components**

Bromochloromethane

CAS-No.  
74-97-5

Revision Date  
2007-03-01

**California Prop. 65 Components**

This product does not contain any chemicals known to the State of California to cause cancer, birth, or any other reproductive defects.

**16. OTHER INFORMATION**

**Further information**

Copyright 2009 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only. The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Co., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.

## SAFETY DATA SHEET

Version 4.3

Revision Date 01/22/2014

Print Date 05/30/2014

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1. PRODUCT AND COMPANY IDENTIFICATION

## 1.1 Product identifiers

Product name : Bromodichloromethane

Product Number : 139181

Brand : Aldrich

REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

CAS-No. : 75-27-4

## 1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses : Laboratory chemicals, Manufacture of substances

## 1.3 Details of the supplier of the safety data sheet

Company : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

## 1.4 Emergency telephone number

Emergency Phone # : (314) 776-6555

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2. HAZARDS IDENTIFICATION

## 2.1 Classification of the substance or mixture

**GHS Classification in accordance with 29 CFR 1910 (OSHA HCS)**

Acute toxicity, Oral (Category 4), H302  
Skin irritation (Category 2), H315  
Serious eye damage (Category 1), H318  
Carcinogenicity (Category 2), H351  
Specific target organ toxicity - single exposure (Category 3), Respiratory system, H335

For the full text of the H-Statements mentioned in this Section, see Section 16.

## 2.2 GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H302 Harmful if swallowed.  
H315 Causes skin irritation.  
H318 Causes serious eye damage.  
H335 May cause respiratory irritation.  
H351 Suspected of causing cancer.

Precautionary statement(s)

P201 Obtain special instructions before use.

P202	Do not handle until all safety precautions have been read and understood.
P261	Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.
P264	Wash skin thoroughly after handling.
P270	Do not eat, drink or smoke when using this product.
P271	Use only outdoors or in a well-ventilated area.
P280	Wear protective gloves/ eye protection/ face protection.
P301 + P312	IF SWALLOWED: Call a POISON CENTER or doctor/ physician if you feel unwell.
P302 + P352	IF ON SKIN: Wash with plenty of soap and water.
P304 + P340	IF INHALED: Remove victim to fresh air and keep at rest in a position comfortable for breathing.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P310	Immediately call a POISON CENTER or doctor/ physician.
P321	Specific treatment (see supplemental first aid instructions on this label).
P330	Rinse mouth.
P332 + P313	If skin irritation occurs: Get medical advice/ attention.
P362	Take off contaminated clothing and wash before reuse.
P403 + P233	Store in a well-ventilated place. Keep container tightly closed.
P405	Store locked up.
P501	Dispose of contents/ container to an approved waste disposal plant.

## 2.3 Hazards not otherwise classified (HNOC) or not covered by GHS - none

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

#### 3.1 Substances

Synonyms	: Dichlorobromomethane
Formula	: CHBrCl <sub>2</sub>
Molecular Weight	: 163.83 g/mol
CAS-No.	: 75-27-4
EC-No.	: 200-856-7

#### Hazardous components

Component	Classification	Concentration
<b>Bromodichloromethane</b>		
	Acute Tox. 4; Skin Irrit. 2; Eye Dam. 1; Carc. 2; STOT SE 3; H302, H315, H318, H335, H351	-

For the full text of the H-Statements mentioned in this Section, see Section 16.

### 4. FIRST AID MEASURES

#### 4.1 Description of first aid measures

##### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

##### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

##### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

##### In case of eye contact

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

##### If swallowed

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

#### **4.2 Most important symptoms and effects, both acute and delayed**

The most important known symptoms and effects are described in the labelling (see section 2.2) and/or in section 11

#### **4.3 Indication of any immediate medical attention and special treatment needed**

no data available

---

### **5. FIREFIGHTING MEASURES**

#### **5.1 Extinguishing media**

##### **Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

#### **5.2 Special hazards arising from the substance or mixture**

Carbon oxides, Hydrogen chloride gas, Hydrogen bromide gas

#### **5.3 Advice for firefighters**

Wear self contained breathing apparatus for fire fighting if necessary.

#### **5.4 Further information**

no data available

---

### **6. ACCIDENTAL RELEASE MEASURES**

#### **6.1 Personal precautions, protective equipment and emergency procedures**

Use personal protective equipment. Avoid breathing vapours, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

For personal protection see section 8.

#### **6.2 Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

#### **6.3 Methods and materials for containment and cleaning up**

Soak up with inert absorbent material and dispose of as hazardous waste. Keep in suitable, closed containers for disposal.

#### **6.4 Reference to other sections**

For disposal see section 13.

---

### **7. HANDLING AND STORAGE**

#### **7.1 Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Normal measures for preventive fire protection.

For precautions see section 2.2.

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

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

#### **7.3 Specific end use(s)**

Apart from the uses mentioned in section 1.2 no other specific uses are stipulated

---

### **8. EXPOSURE CONTROLS/PERSONAL PROTECTION**

#### **8.1 Control parameters**

##### **Components with workplace control parameters**

Contains no substances with occupational exposure limit values.

#### **8.2 Exposure controls**

##### **Appropriate engineering controls**

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

## Personal protective equipment

### Eye/face protection

Tightly fitting safety goggles. Faceshield (8-inch minimum). Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

### Skin protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

Splash contact

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 120 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an industrial hygienist and safety officer familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

### Body Protection

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type ABEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

### Control of environmental exposure

Prevent further leakage or spillage if safe to do so. Do not let product enter drains.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### 9.1 Information on basic physical and chemical properties

- |   |   |
|---|---|
| a) Appearance                                   | Form: liquid, clear<br>Colour: colourless   |
| b) Odour  | no data available                           |
| c) Odour Threshold                              | no data available                           |
| d) pH   | no data available                           |
| e) Melting point/freezing point                 | Melting point/range: -55 °C (-67 °F) - lit. |
| f) Initial boiling point and boiling range      | 87 °C (189 °F) - lit.                       |
| g) Flash point                                  | no data available                           |
| h) Evapouration rate                            | no data available                           |
| i) Flammability (solid, gas)                    | no data available                           |
| j) Upper/lower flammability or explosive limits | no data available                           |
| k) Vapour pressure                              | no data available                           |
| l) Vapour density                               | no data available                           |
| m) Relative density                             | 1.98 g/cm <sup>3</sup> at 25 °C (77 °F)     |

- |    |  |                   |
|----|--|-------------------|
| n) | Water solubility                       | insoluble         |
| o) | Partition coefficient: n-octanol/water | no data available |
| p) | Auto-ignition temperature              | no data available |
| q) | Decomposition temperature              | no data available |
| r) | Viscosity                              | no data available |
| s) | Explosive properties                   | no data available |
| t) | Oxidizing properties                   | no data available |

## 9.2 Other safety information

no data available

---

## 10. STABILITY AND REACTIVITY

### 10.1 Reactivity

no data available

### 10.2 Chemical stability

Stable under recommended storage conditions.

### 10.3 Possibility of hazardous reactions

no data available

### 10.4 Conditions to avoid

no data available

### 10.5 Incompatible materials

Strong oxidizing agents, Strong bases, Magnesium

### 10.6 Hazardous decomposition products

Other decomposition products - no data available

In the event of fire: see section 5

---

## 11. TOXICOLOGICAL INFORMATION

### 11.1 Information on toxicological effects

#### Acute toxicity

LD50 Oral - mouse - 450.0 mg/kg

Remarks: Brain and Coverings:Changes in circulation (hemorrhage,thrombosis, etc.). Liver:Fatty liver degeneration.

Blood: Hemorrhage.

TDLo Oral - rat - 40 mg/kg

Remarks: Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

TDLo Oral - rat - 35 mg/kg

Remarks: Liver:Other changes. Kidney, Ureter, Bladder:Other changes.

TDLo Oral - rat - 20.5 mg/kg

Remarks: Liver:Liver function tests impaired.

TDLo Oral - rat - 400 mg/kg

Remarks: Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels:Hepatic microsomal mixed oxidase (dealkylation, hydroxylation, etc.). Liver:Other changes.

TDLo Oral - rat - 2,000 mg/kg

Remarks: Kidney, Ureter, Bladder:Changes in both tubules and glomeruli. Kidney, Ureter, Bladder:Other changes in urine composition.

TDLo Oral - rat - 9,828 mg/kg

Remarks: Blood:Changes in erythrocyte (RBC) count. Nutritional and Gross Metabolic:Weight loss or decreased weight gain. Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels: Transaminases.



TDLo Oral - rat - 2,904.6 mg/kg

Remarks: Behavioral:Fluid intake. Nutritional and Gross Metabolic:Weight loss or decreased weight gain. Nutritional and Gross Metabolic:Dehydration.

TDLo Oral - rat - 5,366.9 mg/kg

Remarks: Kidney, Ureter, Bladder:Changes in kidney weight. Endocrine:Other changes. Skin and Appendages: Other: Hair.

TDLo Oral - rat - 3,127 mg/kg

Remarks: Behavioral:Fluid intake. Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

TDLo Oral - rat - 20,075 mg/kg

Remarks: Liver:Fatty liver degeneration. Liver:Other changes. Liver:Changes in liver weight.

TDLo Oral - rat - 5,670 mg/kg

Remarks: Liver:Changes in liver weight. Blood:Changes in serum composition (e.g., TP, bilirubin, cholesterol). Nutritional and Gross Metabolic:Weight loss or decreased weight gain.

TDLo Oral - rat - 742 mg/kg

Remarks: Nutritional and Gross Metabolic:Weight loss or decreased weight gain. Behavioral:Food intake (animal).

TDLo Oral - rat - 2,000 mg/kg

Remarks: Kidney, Ureter, Bladder:Changes in both tubules and glomeruli. Kidney, Ureter, Bladder:Other changes in urine composition.

TDLo Oral - rat - 375 mg/kg

Remarks: Endocrine:Estrogenic. Blood:Changes in serum composition (e.g., TP, bilirubin, cholesterol).

TDLo Oral - rat - 750 mg/kg

Remarks: Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels:Hepatic microsomal mixed oxidase (dealkylation, hydroxylation, etc.). Liver:Changes in liver weight. Kidney, Ureter, Bladder:Other changes.

TDLo Oral - mouse - 1,000 mg/kg

Remarks: Kidney, Ureter, Bladder:Renal function tests depressed. Blood:Changes in serum composition (e.g., TP, bilirubin, cholesterol).

TDLo Oral - mouse - 750 mg/kg

Remarks: Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels: Dehydrogenases. Biochemical:Enzyme inhibition, induction, or change in blood or tissue levels: Transaminases. Liver:Changes in liver weight.

TDLo Oral - rabbit - 59.5 mg/kg

Remarks: Behavioral:Fluid intake. Behavioral:Food intake (animal).

Inhalation: no data available

Dermal: no data available

no data available

#### **Skin corrosion/irritation**

Irritating to eyes, respiratory system and skin.

#### **Serious eye damage/eye irritation**

no data available

#### **Respiratory or skin sensitisation**

no data available

#### **Germ cell mutagenicity**

Laboratory experiments have shown mutagenic effects.

#### **Carcinogenicity**

This product is or contains a component that has been reported to be possibly carcinogenic based on its IARC, ACGIH, NTP, or EPA classification.

Limited evidence of carcinogenicity in animal studies

IARC: 2B - Group 2B: Possibly carcinogenic to humans (Bromodichloromethane)  
ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.  
NTP: Reasonably anticipated to be a human carcinogen (Bromodichloromethane)  
OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

no data available

no data available

**Specific target organ toxicity - single exposure**

Inhalation - May cause respiratory irritation.

**Specific target organ toxicity - repeated exposure**

no data available

**Aspiration hazard**

no data available

**Additional Information**

RTECS: PA5310000

prolonged or repeated exposure can cause: Nausea, Dizziness, Headache, narcosis

Stomach - Irregularities - Based on Human Evidence

---

## 12. ECOLOGICAL INFORMATION

### 12.1 Toxicity

no data available

### 12.2 Persistence and degradability

no data available

### 12.3 Bioaccumulative potential

no data available

### 12.4 Mobility in soil

no data available

### 12.5 Results of PBT and vPvB assessment

PBT/vPvB assessment not available as chemical safety assessment not required/not conducted

### 12.6 Other adverse effects

no data available

---

## 13. DISPOSAL CONSIDERATIONS

### 13.1 Waste treatment methods

**Product**

Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material. Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber.

**Contaminated packaging**

Dispose of as unused product.

---

## 14. TRANSPORT INFORMATION

**DOT (US)**

UN number: 3082      Class: 9

Packing group: III

Proper shipping name: Environmentally hazardous substances, liquid, n.o.s. (Bromodichloromethane)

Reportable Quantity (RQ): 5000 lbs

Marine pollutant: No  
Poison Inhalation Hazard: No

#### IMDG

Not dangerous goods

#### IATA

Not dangerous goods

---

### 15. REGULATORY INFORMATION

REACH No. : A registration number is not available for this substance as the substance or its uses are exempted from registration, the annual tonnage does not require a registration or the registration is envisaged for a later registration deadline.

#### SARA 302 Components

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

#### SARA 313 Components

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

#### SARA 311/312 Hazards

Acute Health Hazard, Chronic Health Hazard

#### Massachusetts Right To Know Components

No components are subject to the Massachusetts Right to Know Act.

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Bromodichloromethane	75-27-4	2009-07-17

#### New Jersey Right To Know Components

	CAS-No.	Revision Date
Bromodichloromethane	75-27-4	2009-07-17

#### California Prop. 65 Components

WARNING! This product contains a chemical known to the State of California to cause cancer.

	CAS-No.	Revision Date
Bromodichloromethane	75-27-4	2007-09-28

---

### 16. OTHER INFORMATION

#### Full text of H-Statements referred to under sections 2 and 3.

Acute Tox.	Acute toxicity
Carc.	Carcinogenicity
Eye Dam.	Serious eye damage
H302	Harmful if swallowed.
H315	Causes skin irritation.
H318	Causes serious eye damage.
H335	May cause respiratory irritation.
H351	Suspected of causing cancer.
Skin Irrit.	Skin irritation
STOT SE	Specific target organ toxicity - single exposure

#### HMIS Rating

Health hazard:	2
Chronic Health Hazard:	*
Flammability:	0
Physical Hazard	0

#### NFPA Rating

Health hazard:	2
----------------	---

Fire Hazard: 0  
Reactivity Hazard: 0

**Further information**

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The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Corporation and its Affiliates shall not be held liable for any damage resulting from handling or from contact with the above product. See [www.sigma-aldrich.com](http://www.sigma-aldrich.com) and/or the reverse side of invoice or packing slip for additional terms and conditions of sale.

**Preparation Information**

Sigma-Aldrich Corporation  
Product Safety – Americas Region  
1-800-521-8956

Version: 4.3

Revision Date: 01/22/2014

Print Date: 05/30/2014

## Material Safety Data Sheet

Version 3.9

Revision Date 12/05/2012

Print Date 05/30/2014

---

1. PRODUCT AND COMPANY IDENTIFICATION

Product name : Bromomethane

Product Number : 295485

Brand : Aldrich

Supplier : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

Preparation Information : Sigma-Aldrich Corporation  
Product Safety - Americas Region  
1-800-521-8956

---

2. HAZARDS IDENTIFICATION

## Emergency Overview

## OSHA Hazards

Compressed Gas, Toxic by inhalation., Toxic by ingestion, Irritant, Reproductive hazard, Mutagen

## Target Organs

Central nervous system, Kidney

## GHS Classification

Gases under pressure (Compressed gas)

Acute toxicity, Oral (Category 3)

Skin irritation (Category 2)

Eye irritation (Category 2A)

Germ cell mutagenicity (Category 2)

Specific target organ toxicity - single exposure (Category 3)

Specific target organ toxicity - repeated exposure (Category 2)

Acute aquatic toxicity (Category 1)

Hazardous to the ozone layer (Category 1)

## GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H280	Contains gas under pressure; may explode if heated.
H301	Toxic if swallowed.
H315	Causes skin irritation.
H319	Causes serious eye irritation.
H335	May cause respiratory irritation.
H341	Suspected of causing genetic defects.
H373	May cause damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.

H420 Harms public health and the environment by destroying ozone in the upper atmosphere

Precautionary statement(s)

P261 Avoid breathing dust/ fume/ gas/ mist/ vapours/ spray.  
P273 Avoid release to the environment.  
P281 Use personal protective equipment as required.  
P301 + P310 IF SWALLOWED: Immediately call a POISON CENTER or doctor/ physician.  
P305 + P351 + P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.  
P410 + P403 Protect from sunlight. Store in a well-ventilated place.

**HMIS Classification**

**Health hazard:** 2  
**Chronic Health Hazard:** \*  
**Flammability:** 0  
**Physical hazards:** 0

**NFPA Rating**

**Health hazard:** 2  
**Fire:** 0  
**Reactivity Hazard:** 0

**Potential Health Effects**

**Inhalation** Toxic if inhaled. Causes respiratory tract irritation.  
**Skin** May be harmful if absorbed through skin. Causes skin irritation.  
**Eyes** Causes eye irritation.  
**Ingestion** Toxic if swallowed.

---

**3. COMPOSITION/INFORMATION ON INGREDIENTS**

Synonyms : Methyl bromide

Formula : CH<sub>3</sub>Br CH<sub>3</sub>Br

Molecular Weight : 94.94 g/mol

Component		Concentration
<b>Bromomethane</b>		
CAS-No.	74-83-9	-
EC-No.	200-813-2	
Index-No.	602-002-00-2	

---

**4. FIRST AID MEASURES**

**General advice**

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

**If inhaled**

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

**In case of skin contact**

Wash off with soap and plenty of water. Take victim immediately to hospital. Consult a physician.

**In case of eye contact**

Rinse thoroughly with plenty of water for at least 15 minutes and consult a physician.

**If swallowed**

Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

---

**5. FIREFIGHTING MEASURES**

**Conditions of flammability**

Not flammable or combustible.

**Suitable extinguishing media**

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

**Special protective equipment for firefighters**

Wear self contained breathing apparatus for fire fighting if necessary.

**Hazardous combustion products**

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen bromide gas

**Further information**

Use water spray to cool unopened containers.

---

**6. ACCIDENTAL RELEASE MEASURES****Personal precautions**

Wear respiratory protection. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Evacuate personnel to safe areas.

**Environmental precautions**

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

**Methods and materials for containment and cleaning up**

Clean up promptly by sweeping or vacuum.

---

**7. HANDLING AND STORAGE****Precautions for safe handling**

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

**Conditions for safe storage**

Keep container tightly closed in a dry and well-ventilated place.

Contents under pressure. Refrigerate before opening.

---

**8. EXPOSURE CONTROLS/PERSONAL PROTECTION****Components with workplace control parameters**

Components	CAS-No.	Value	Control parameters	Basis
Remarks	Potential Occupational Carcinogen See Appendix A			
Bromomethane	74-83-9	TWA	1 ppm	USA. ACGIH Threshold Limit Values (TLV)
	Skin & Upper Respiratory Tract Not classifiable as a human carcinogen Danger of cutaneous absorption			
		TWA	5 ppm 20 mg/m3	USA. OSHA - TABLE Z-1 Limits for Air Contaminants - 1910.1000
	Skin notation			
		C	20 ppm 80 mg/m3	USA. Occupational Exposure Limits (OSHA) - Table Z-1 Limits for Air Contaminants
	Skin designation The value in mg/m3 is approximate. Ceiling limit is to be determined from breathing-zone air samples.			

**Personal protective equipment****Respiratory protection**

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

**Hand protection**

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

**Full contact**

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

**Splash protection**

Material: Fluorinated rubber

Minimum layer thickness: 0.7 mm

Break through time: 480 min

Material tested: Vitoject® (KCL 890 / Aldrich Z677698, Size M)

data source: KCL GmbH, D-36124 Eichenzell, phone +49 (0)6659 87300, e-mail sales@kcl.de, test method: EN374

If used in solution, or mixed with other substances, and under conditions which differ from EN 374, contact the supplier of the CE approved gloves. This recommendation is advisory only and must be evaluated by an Industrial Hygienist familiar with the specific situation of anticipated use by our customers. It should not be construed as offering an approval for any specific use scenario.

**Eye protection**

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

**Skin and body protection**

Complete suit protecting against chemicals, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

**Hygiene measures**

Avoid contact with skin, eyes and clothing. Wash hands before breaks and immediately after handling the product.

---

**9. PHYSICAL AND CHEMICAL PROPERTIES****Appearance**

Form	Compressed gas
Colour	colourless

**Safety data**

pH	no data available
Melting point/freezing point	Melting point/range: -94 °C (-137 °F) - lit.
Boiling point	4 °C (39 °F) - lit.
Flash point	no data available
Ignition temperature	536 °C (997 °F)
Auto-ignition temperature	536.0 °C (996.8 °F) - Auto-flammability
Lower explosion limit	8.6 %(V)
Upper explosion limit	20 %(V)
Vapour pressure	1,893.2 hPa (1,420.0 mmHg) at 20.0 °C (68.0 °F) 5,259.6 hPa (3,945.0 mmHg) at 55.0 °C (131.0 °F) 1,866.5 hPa (1,400.0 mmHg) at 20.0 °C (68.0 °F)
Density	3.3 g/cm <sup>3</sup> at 25 °C (77 °F)
Water solubility	soluble
Partition coefficient: n-octanol/water	no data available



Relative vapor density	no data available
Odour	characteristic
Odour Threshold	no data available
Evaporation rate	no data available

---

## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

no data available

### Conditions to avoid

no data available

### Materials to avoid

Strong oxidizing agents, Plastics, Rubber, Aluminum, Strong bases, and its alloys, Alkali metals, Zinc

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen bromide gas

Other decomposition products - no data available

---

## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

LD50 Oral - rat - 214.0 mg/kg

#### Inhalation LC50

LC50 Inhalation - rat - 8 h - 302 ppm

Remarks: Behavioral:Change in motor activity (specific assay). Nutritional and Gross Metabolic:Weight loss or decreased weight gain. Nutritional and Gross Metabolic:Changes in:Body temperature decrease.

#### Dermal LD50

no data available

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available

### Respiratory or skin sensitization

no data available

### Germ cell mutagenicity

In vitro tests showed mutagenic effects

### Carcinogenicity

This product is or contains a component that is not classifiable as to its carcinogenicity based on its IARC, ACGIH, NTP, or EPA classification.

IARC: 3 - Group 3: Not classifiable as to its carcinogenicity to humans (Bromomethane)

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a

known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

### **Reproductive toxicity**

Experiments have shown reproductive toxicity effects in male and female laboratory animals.

### **Teratogenicity**

no data available

### **Specific target organ toxicity - single exposure (Globally Harmonized System)**

May cause respiratory irritation.

### **Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

The substance or mixture is classified as specific target organ toxicant, repeated exposure, category 2.

### **Aspiration hazard**

no data available

### **Potential health effects**

<b>Inhalation</b>	Toxic if inhaled. Causes respiratory tract irritation.
<b>Ingestion</b>	Toxic if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. Causes skin irritation.
<b>Eyes</b>	Causes eye irritation.

### **Signs and Symptoms of Exposure**

Nausea, Dizziness, Headache, Anorexia., Vomiting, Weakness, Blurred vision, Confusion., Tremors, Convulsions, Pulmonary edema. Effects may be delayed., Cyanosis, Coma., possibly death

### **Synergistic effects**

no data available

### **Additional Information**

RTECS: PA4900000

---

## **12. ECOLOGICAL INFORMATION**

### **Toxicity**

Toxicity to fish	LC50 - other fish - 0.800 mg/l - 96.0 h
Toxicity to daphnia and other aquatic invertebrates	Immobilization EC50 - Daphnia magna (Water flea) - 2 mg/l - 48 h

### **Persistence and degradability**

no data available

### **Bioaccumulative potential**

no data available

### **Mobility in soil**

no data available

### **PBT and vPvB assessment**

no data available

### **Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Very toxic to aquatic life.

---

### 13. DISPOSAL CONSIDERATIONS

#### Product

Contact a licensed professional waste disposal service to dispose of this material. Offer surplus and non-recyclable solutions to a licensed disposal company.

#### Contaminated packaging

Dispose of as unused product.

---

### 14. TRANSPORT INFORMATION

#### DOT (US)

UN number: 1062 Class: 2.3  
Proper shipping name: Methyl bromide  
Reportable Quantity (RQ): 1000 lbs  
Marine Pollutant: No  
Poison Inhalation Hazard: Hazard zone C

#### IMDG

UN number: 1062 Class: 2.3  
Proper shipping name: METHYL BROMIDE  
Marine Pollutant: No

EMS-No: F-C, S-U

#### IATA

UN number: 1062 Class: 2.3  
Proper shipping name: Methyl bromide  
IATA Passenger: Not permitted for transport  
IATA Cargo: Not permitted for transport

---

### 15. REGULATORY INFORMATION

#### OSHA Hazards

Compressed Gas, Toxic by inhalation., Toxic by ingestion, Irritant, Reproductive hazard, Mutagen

#### SARA 302 Components

The following components are subject to reporting levels established by SARA Title III, Section 302:

	CAS-No.	Revision Date
Bromomethane	74-83-9	2007-07-01

#### SARA 313 Components

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

#### SARA 311/312 Hazards

Sudden Release of Pressure Hazard, Acute Health Hazard, Chronic Health Hazard

#### Massachusetts Right To Know Components

	CAS-No.	Revision Date
Bromomethane	74-83-9	2007-07-01

#### Pennsylvania Right To Know Components

	CAS-No.	Revision Date
Bromomethane	74-83-9	2007-07-01

#### New Jersey Right To Know Components

	CAS-No.	Revision Date
Bromomethane	74-83-9	2007-07-01

#### California Prop. 65 Components

	CAS-No.	Revision Date
WARNING! This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.	74-83-9	2009-02-01
Bromomethane		

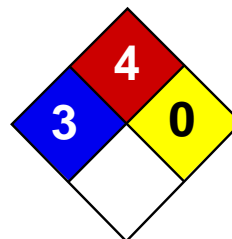
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### 16. OTHER INFORMATION

**Further information**

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Health	3
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Carbon disulfide MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Carbon disulfide

**Catalog Codes:** SLC4312, SLC1522

**CAS#:** 75-15-0

**RTECS:** FF6650000

**TSCA:** TSCA 8(b) inventory: Carbon disulfide

**CI#:** Not available.

**Synonym:**

**Chemical Formula:** CS<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
Carbon disulfide	75-15-0	100

**Toxicological Data on Ingredients:** Carbon disulfide: ORAL (LD50): Acute: 3188 mg/kg [Rat]. 2780 mg/kg [Mouse]. VAPOR (LC50): Acute: 12500 ppm 4 hour(s) [Rat].

#### Section 3: Hazards Identification

**Potential Acute Health Effects:**

Extremely hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Very 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 skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. 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 kidneys, the nervous system, liver. 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. 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:** 90°C (194°F)

**Flash Points:** CLOSED CUP: -30°C (-22°F). (Setaflash)

**Flammable Limits:** LOWER: 1.3% UPPER: 50%

**Products of Combustion:** Not available.

**Fire Hazards in Presence of Various Substances:** Flammable in presence of open flames and sparks, of oxidizing materials.

**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:** 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: 20 CEIL: 30 (ppm) TWA: 60 CEIL: 90 (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:** 76.14 g/mole

**Color:** Clear Colorless.

**pH (1% soln/water):** 7 [Neutral.]

**Boiling Point:** 46.3°C (115.3°F)

**Melting Point:** -111.6°C (-168.9°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.2632 (Water = 1)

**Vapor Pressure:** 297.6 mm of Hg (@ 20°C)

**Vapor Density:** 2.63 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 0.1 ppm

**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:** 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): 2780 mg/kg [Mouse]. Acute toxicity of the vapor (LC50): 12500 ppm 4 hour(s) [Rat].

**Chronic Effects on Humans:** The substance is toxic to kidneys, the nervous system, liver.

**Other Toxic Effects on Humans:**

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

**Special Remarks on Toxicity to Animals:** Not available.

**Special Remarks on Chronic Effects on Humans:**

Embryotoxic and/or foetotoxic in animal. Human: passes through the placenta, excreted in maternal milk. Risk of spontaneous abortion in human. Causes sperm abnormalities in human. Menstrual disorders in human.

**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:** : Carbon Disulfide : UN1131 PG: II

**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: Carbon disulfide California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (female) which would require a warning under the statute: Carbon disulfide California prop. 65: This product contains the following ingredients for which the State of California has found to cause reproductive harm (male) which would require a warning under the statute: Carbon disulfide 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: Carbon disulfide Pennsylvania RTK: Carbon disulfide Massachusetts RTK: Carbon disulfide TSCA 8(b) inventory: Carbon disulfide SARA 302/304/311/312 extremely hazardous substances: Carbon disulfide SARA 313 toxic chemical notification and release reporting: Carbon disulfide CERCLA: Hazardous substances.: Carbon disulfide

**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-1A: Material causing immediate and serious toxic effects (VERY TOXIC). 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:** 3

**Fire Hazard:** 3

**Reactivity:** 0

**Personal Protection:** h

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

**Health:** 3

**Flammability:** 4

**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 08:16 PM

**Last Updated:** 05/21/2013 12:00 PM

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# MATERIAL SAFETY DATA SHEET

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## 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

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**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: CARBON TETRACHLORIDE**

**TRADE NAMES/SYNONYMS:**

CARBON CHLORIDE (CCl<sub>4</sub>); PERCHLOROMETHANE; TETRACHLOROMETHANE;  
BENZINOFORM; RCRA U211; R 10 (REFRIGERANT); UN 1846; CCl<sub>4</sub>; MAT04310; RTECS  
FG4900000

**CHEMICAL FAMILY:** halogenated, aliphatic

**CREATION DATE:** Jan 24 1989

**REVISION DATE:** Dec 11 2008

---

## 2. COMPOSITION, INFORMATION ON INGREDIENTS

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**COMPONENT:** CARBON TETRACHLORIDE

**CAS NUMBER:** 56-23-5

**PERCENTAGE:** 100

---

## 3. HAZARDS IDENTIFICATION

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**NFPA RATINGS (SCALE 0-4):** HEALTH=3 FIRE=1 REACTIVITY=0



**EMERGENCY OVERVIEW:**

**COLOR:** colorless

**PHYSICAL FORM:** liquid

**ODOR:** distinct odor

**MAJOR HEALTH HAZARDS:** central nervous system depression, suspect cancer hazard (in animals)

**POTENTIAL HEALTH EFFECTS:**

**INHALATION:**

**SHORT TERM EXPOSURE:** irritation, digestive disorders, headache, drowsiness, dizziness, loss of coordination, lung congestion, effects on the brain, convulsions, coma

**LONG TERM EXPOSURE:** irritation, digestive disorders, headache, drowsiness, dizziness, loss of coordination, visual disturbances, lung congestion, kidney damage, liver damage, reproductive effects, effects on the brain, convulsions, coma, cancer

**SKIN CONTACT:**

**SHORT TERM EXPOSURE:** irritation, rash, absorption may occur, digestive disorders, headache, drowsiness, dizziness, loss of coordination, lung congestion, effects on the brain, convulsions, coma

**LONG TERM EXPOSURE:** visual disturbances, kidney damage, liver damage, reproductive effects, cancer

**EYE CONTACT:**

**SHORT TERM EXPOSURE:** irritation

**LONG TERM EXPOSURE:** no information is available

**INGESTION:**

**SHORT TERM EXPOSURE:** irritation, digestive disorders, headache, drowsiness, dizziness, loss of coordination, lung congestion, effects on the brain, convulsions, coma

**LONG TERM EXPOSURE:** kidney damage, liver damage, cancer

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## 4. FIRST AID MEASURES

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**INHALATION:** If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. 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:** If swallowed, drink plenty of water, do NOT induce vomiting. Get immediate medical attention. Induce vomiting only at the instructions of a physician. Do not give anything by mouth to unconscious or convulsive person.

**NOTE TO PHYSICIAN:** For ingestion, consider gastric lavage.

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## 5. FIRE FIGHTING MEASURES

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**FIRE AND EXPLOSION HAZARDS:** Slight fire hazard.

**EXTINGUISHING MEDIA:** regular dry chemical, regular foam, water

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. Fight large fires from a protected location or safe distance. Stay away from the ends of tanks. Dike for later disposal. Do not scatter

spilled material with high-pressure water streams. Do not attempt to extinguish fire unless flow of material can be stopped first. Use extinguishing agents appropriate for surrounding fire. Flood with fine water spray. 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. Consider downwind evacuation if material is leaking.

**FLASH POINT:** not flammable

---

## 6. ACCIDENTAL RELEASE MEASURES

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### **AIR RELEASE:**

Reduce vapors with water spray. Stay upwind and keep out of low areas.

### **SOIL RELEASE:**

Trap spilled material at bottom in deep water pockets, excavated holding areas or within sand bag barriers. Dike for later disposal. Absorb with sand or other non-combustible material. Collect with absorbent into suitable container.

### **WATER RELEASE:**

Trap spilled material at bottom in deep water pockets, excavated holding areas or within sand bag barriers. Remove trapped material with suction hoses. Absorb with activated carbon. Collect spilled material using mechanical equipment. Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

### **OCCUPATIONAL RELEASE:**

Do not touch spilled material. 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. Small dry spills: Move containers away from spill to a safe area. Large spills: Dike for later disposal. Keep unnecessary people away, isolate hazard area and deny entry. Ventilate closed spaces before entering. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

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## 7. HANDLING AND STORAGE

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**STORAGE:** Store and handle in accordance with all current regulations and standards. Protect from physical damage. Store in a cool, dry place. Store in a well-ventilated area. Avoid heat, flames, sparks and other sources of ignition. Keep separated from incompatible substances.

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## 8. EXPOSURE CONTROLS, PERSONAL PROTECTION

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**EXPOSURE LIMITS:**

**CARBON TETRACHLORIDE:**

10 ppm OSHA TWA

25 ppm OSHA ceiling

200 ppm OSHA peak (5 minutes in any 4 hours)

2 ppm (12.6 mg/m<sup>3</sup>) OSHA TWA (vacated by 58 FR 35338, June 30, 1993)

5 ppm ACGIH TWA (cutaneous absorption danger)

10 ppm ACGIH STEL (cutaneous absorption danger)

2 ppm (12.6 mg/m<sup>3</sup>) NIOSH recommended STEL 60 minute(s)

**VENTILATION:** Provide local exhaust or process enclosure 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:** The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.

**At any detectable concentration -**

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.

**Escape -**

Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.

Any appropriate escape-type, self-contained breathing apparatus.

**For Unknown Concentrations or Immediately Dangerous to Life or Health -**

Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in 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

**APPEARANCE:** clear

**COLOR:** colorless

**ODOR:** distinct odor

**MOLECULAR WEIGHT:** 153.82

**MOLECULAR FORMULA:** C-Cl<sub>4</sub>

**BOILING POINT:** 171 F (77 C)

**FREEZING POINT:** -9 F (-23 C)

**VAPOR PRESSURE:** 91.3 mmHg @ 20 C

**VAPOR DENSITY (air=1):** 5.32

**SPECIFIC GRAVITY (water=1):** 1.5940

**WATER SOLUBILITY:** 0.08% @ 20 C

**PH:** Not available

**VOLATILITY:** 100%

**ODOR THRESHOLD:** 50 ppm

**EVAPORATION RATE:** 12.8 (butyl acetate=1)

**COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not available

**SOLVENT SOLUBILITY:**

**Soluble:** alcohol, benzene, chloroform, ether, carbon disulfide, petroleum ether, naphtha, acetone, fixed & volatile oils

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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.

**INCOMPATIBILITIES:** combustible materials, metal salts, peroxides, halogens, oxidizing materials, metals, bases, amines

**HAZARDOUS DECOMPOSITION:**

Thermal decomposition products: phosgene, halogenated compounds, oxides of carbon

**POLYMERIZATION:** Will not polymerize.

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## 11. TOXICOLOGICAL INFORMATION

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**CARBON TETRACHLORIDE:**

**IRRITATION DATA:** 4 mg skin-rabbit mild; 500 mg/24 hour(s) skin-rabbit mild; 2200 ug/30 second(s) eyes-rabbit mild; 500 mg/24 hour(s) eyes-rabbit mild

**TOXICITY DATA:** 8000 ppm/4 hour(s) inhalation-rat LC<sub>50</sub>; >20 gm/kg skin-rabbit LD<sub>50</sub>; 2350 mg/kg oral-rat LD<sub>50</sub>

**CARCINOGEN STATUS:** NTP: Anticipated Human Carcinogen; IARC: Animal Sufficient Evidence, Human Inadequate Evidence, Group 2B; ACGIH: A2 -Suspected Human Carcinogen; EC: Category 3

**ACUTE TOXICITY LEVEL:**

Moderately Toxic: ingestion

Slightly Toxic: inhalation, dermal absorption

**TARGET ORGANS:** central nervous system, liver, kidneys

**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** history of alcoholism, alcoholism

**TUMORIGENIC DATA:** Available.

**MUTAGENIC DATA:** Available.

**REPRODUCTIVE EFFECTS DATA:** Available.

**ADDITIONAL DATA:** May cross the placenta. May be excreted in breast milk. Alcohol may enhance the toxic effects. Stimulants such as epinephrine may induce ventricular fibrillation.

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## 12. ECOLOGICAL INFORMATION

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**ECOTOXICITY DATA:**

**FISH TOXICITY:** 43100 ug/L 96 hour(s) LC50 (Mortality) Fathead minnow (*Pimephales promelas*)

**INVERTEBRATE TOXICITY:** 1500 ug/L 7 hour(s) EC50 (Regeneration) Flatworm (*Dugesia japonica*)

**ALGAL TOXICITY:** >136000 ug/L NR hour(s) EC10 (Population Growth) Green algae (*Haematococcus pluvialis*)

**OTHER TOXICITY:** 900 ug/L 8 hour(s) EC50 (Teratogenesis) Leopard frog (*Rana pipiens*)

**FATE AND TRANSPORT:**

**BIOCONCENTRATION:** 30 ug/L 1-21 hour(s) BCF (Residue) Bluegill (*Lepomis macrochirus*) 52.3 ug/L

**ENVIRONMENTAL SUMMARY:** Moderately toxic to aquatic life.

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## 13. DISPOSAL CONSIDERATIONS

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Dispose in accordance with all applicable regulations. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U211. Hazardous Waste Number(s): D019. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 0.5 mg/L.

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## 14. TRANSPORT INFORMATION

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**U.S. DOT 49 CFR 172.101:**

**PROPER SHIPPING NAME:** Carbon tetrachloride

**ID NUMBER:** UN1846

**HAZARD CLASS OR DIVISION:** 6.1

**PACKING GROUP:** II

**LABELING REQUIREMENTS:** 6.1

**MARINE POLLUTANT:** CARBON TETRACHLORIDE



**CANADIAN TRANSPORTATION OF DANGEROUS GOODS:**

**SHIPPING NAME:** Carbon tetrachloride

**UN NUMBER:** UN1846



**CLASS:** 6.1

**PACKING GROUP/CATEGORY:** II

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## 15. REGULATORY INFORMATION

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### **U.S. REGULATIONS:**

**CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):**

**Carbon tetrachloride:** 10 LBS RQ

**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: Yes

FIRE: No

REACTIVE: No

SUDDEN RELEASE: No

**SARA TITLE III SECTION 313 (40 CFR 372.65):**

**Carbon tetrachloride**

**OSHA PROCESS SAFETY (29 CFR 1910.119):** Not regulated.

### **STATE REGULATIONS:**

**California Proposition 65:**

Known to the state of California to cause the following:

**Carbon tetrachloride**

Cancer (Oct 01, 1987)

### **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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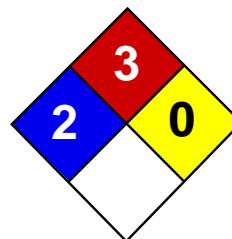
## 16. OTHER INFORMATION

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Health	2
Fire	3
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Chlorobenzene MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Chlorobenzene

**Catalog Codes:** SLC1654

**CAS#:** 108-90-7

**RTECS:** CZ0175000

**TSCA:** TSCA 8(b) inventory: Chlorobenzene

**CI#:** Not available.

**Synonym:** Monochlorobenzene

**Chemical Name:** Not available.

**Chemical Formula:** C<sub>6</sub>H<sub>5</sub>Cl

#### 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
Chlorobenzene	108-90-7	100

**Toxicological Data on Ingredients:** Chlorobenzene: ORAL (LD50): Acute: 1110 mg/kg [Rat]. 2300 mg/kg [Mouse].

#### Section 3: Hazards Identification

##### Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, sensitizer, 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:

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, sensitizer, permeator). CARCINOGENIC EFFECTS: Not available. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance is toxic to kidneys, lungs, the nervous system, liver, 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:**

If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. If the chemical got on the victim's exposed skin, such as the hands : Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. 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:** Flammable.

**Auto-Ignition Temperature:** 638°C (1180.4°F)

**Flash Points:** CLOSED CUP: 29.44°C (85°F).

**Flammable Limits:** LOWER: 1.3% 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.

**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 container dry. 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. Never add water to this product. 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: 10 (ppm) TWA: 46 (mg/m<sup>3</sup>) Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Almond-like.

**Taste:** Not available.

**Molecular Weight:** 112.56 g/mole

**Color:** Colorless.

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

**Boiling Point:** 132°C (269.6°F)

**Melting Point:** -45.6°C (-50.1°F)

**Critical Temperature:** Not available.

**Specific Gravity:** 1.1058 (Water = 1)

**Vapor Pressure:** 8.8 mm of Hg (@ 20°C)

**Vapor Density:** 3.88 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 0.2 ppm

**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. 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:** Not available.

**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): 1110 mg/kg [Rat].

**Chronic Effects on Humans:** The substance is toxic to kidneys, lungs, the nervous system, liver, mucous membranes.

**Other Toxic Effects on Humans:**

Very hazardous in case of skin contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (corrosive, sensitizer, 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:** : Chlorobenzene : UN1134 PG: III

**Special Provisions for Transport:** Not available.

## Section 15: Other Regulatory Information

### Federal and State Regulations:

Pennsylvania RTK: Chlorobenzene Massachusetts RTK: Chlorobenzene TSCA 8(b) inventory: Chlorobenzene SARA 313 toxic chemical notification and release reporting: Chlorobenzene CERCLA: Hazardous substances.: Chlorobenzene

**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-2B: Material causing other toxic effects (TOXIC).

#### DSCL (EEC):

R10- Flammable. R22- Harmful if swallowed. R38- Irritating to skin. R41- Risk of serious damage to eyes. R43- May cause sensitization by skin contact.

#### 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 08:16 PM

**Last Updated:** 05/21/2013 12:00 PM

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## Section 1. Chemical product and company identification

<b>Product name</b>	: Ethyl Chloride
<b>Supplier</b>	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
<b>Product use</b>	: Synthetic/Analytical chemistry.
<b>Synonym</b>	: Ethane, chloro-; Aethylis; Aethylis chloridum; Anodynon; Chelen; Chlorene; Chlorethyl; Chloridum; Chloroethane; Chloryl; Chloryl anesthetic; Cloreto; Dublofix; Ether chloratus; Ether hydrochloric; Ether muriatic; Hydrochloric ether; Kelene; Monochlorethane; Monochloroethane; Muriatic ether; Narcotile; C <sub>2</sub> H <sub>5</sub> Cl; Aethylchlorid; Chloorethaan; Chloroethan; Chlorure D'ethyle; Cloroetano; Cloruro di etile; Etylu chlorek; NCI-C06224; UN 1037; Aethylisaethylis chloridum; Chloryle anesthetic; 1-Chloroethane
<b>MSDS #</b>	: 001023
<b>Date of Preparation/ Revision</b>	: <b>9/25/2013.</b>
<b>In case of emergency</b>	: 1-866-734-3438

## Section 2. Hazards identification

<b>Physical state</b>	: Gas. [COLORLESS LIQUID OR GAS WITH A PUNGENT, ETHER-LIKE ODOR]
<b>Emergency overview</b>	: WARNING! FLAMMABLE GAS. MAY CAUSE FLASH FIRE. MAY CAUSE EYE AND SKIN IRRITATION. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. CONTENTS UNDER PRESSURE. Keep away from heat, sparks and flame. Do not puncture or incinerate container. Avoid contact with eyes, skin and clothing. May cause target organ damage, based on animal data. Use only with adequate ventilation. Wash thoroughly after handling. Keep container closed. Contact with rapidly expanding gases can cause frostbite.
<b>Target organs</b>	: May cause damage to the following organs: kidneys, the nervous system, liver, mucous membranes, cardiovascular system, upper respiratory tract, skin, eyes, central nervous system (CNS).
<b>Routes of entry</b>	: Inhalation Dermal Eyes
<b>Potential acute health effects</b>	
<b>Eyes</b>	: Moderately irritating to eyes. Contact with rapidly expanding gas may cause burns or frostbite.
<b>Skin</b>	: Moderately irritating to the skin. Contact with rapidly expanding gas may cause burns or frostbite.
<b>Inhalation</b>	: Acts as a simple asphyxiant.
<b>Ingestion</b>	: Ingestion is not a normal route of exposure for gases
<b>Potential chronic health effects</b>	
<b>Target organs</b>	: May cause damage to the following organs: kidneys, the nervous system, liver, mucous membranes, cardiovascular system, upper respiratory tract, skin, eyes, central nervous system (CNS).



## Ethyl Chloride

### Medical conditions aggravated by over-exposure

: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

## Section 3. Composition, Information on Ingredients

Name	CAS number	% Volume	Exposure limits
Ethyl Chloride	75-00-3	100	<b>ACGIH TLV (United States, 3/2012).</b> <b>Absorbed through skin.</b> TWA: 264 mg/m <sup>3</sup> 8 hours. TWA: 100 ppm 8 hours. <b>OSHA PEL (United States, 6/2010).</b> TWA: 2600 mg/m <sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours. <b>OSHA PEL 1989 (United States, 3/1989).</b> TWA: 2600 mg/m <sup>3</sup> 8 hours. TWA: 1000 ppm 8 hours.

## Section 4. First aid measures

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

- Eye contact** : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
- Skin contact** : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
- Frostbite** : Try to warm up the frozen tissues and seek medical attention.
- Inhalation** : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
- Ingestion** : As this product is a gas, refer to the inhalation section.

## Section 5. Fire-fighting measures

- Flammability of the product** : Flammable.
- Auto-ignition temperature** : 518.75°C (965.8°F)
- Flash point** : Closed cup: -50.15°C (-58.3°F).
- Flammable limits** : Lower: 3.8% Upper: 15.4%
- Products of combustion** : Decomposition products may include the following materials:  
carbon dioxide  
carbon monoxide  
halogenated compounds  
carbonyl halides
- Fire hazards in the presence of various substances** : Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge, heat and oxidizing materials.
- Fire-fighting media and instructions** : In case of fire, use water spray (fog), foam or dry chemical.
- In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

**Special protective equipment for fire-fighters**

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

**Section 6. Accidental release measures****Personal precautions**

- : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

**Environmental precautions**

- : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

**Methods for cleaning up**

- : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

**Section 7. Handling and storage****Handling**

- : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. High pressure gas. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Keep container closed. Avoid contact with skin and clothing. Avoid contact with eyes. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

**Storage**

- : 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). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

**Section 8. Exposure controls/personal protection****Engineering controls**

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

**Personal protection****Eyes**

- : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

**Skin**

- : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory**

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

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

**Hands**

- : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

**Personal protection in case of a large spill**

- : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product. Full chemical-resistant suit and self-contained breathing apparatus should be worn only by trained and authorized persons.

**Product name**

## Ethyl Chloride

chloroethane

**ACGIH TLV (United States, 3/2012). Absorbed through skin.**

TWA: 264 mg/m<sup>3</sup> 8 hours.

TWA: 100 ppm 8 hours.

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

TWA: 2600 mg/m<sup>3</sup> 8 hours.

TWA: 1000 ppm 8 hours.

**OSHA PEL 1989 (United States, 3/1989).**

TWA: 2600 mg/m<sup>3</sup> 8 hours.

TWA: 1000 ppm 8 hours.

Consult local authorities for acceptable exposure limits.

## Section 9. Physical and chemical properties

<b>Molecular weight</b>	: 64.52 g/mole
<b>Molecular formula</b>	: C <sub>2</sub> H <sub>5</sub> Cl
<b>Boiling/condensation point</b>	: 12.2°C (54°F)
<b>Melting/freezing point</b>	: -138.9°C (-218°F)
<b>Critical temperature</b>	: 187.3°C (369.1°F)
<b>Vapor density</b>	: 2.2 (Air = 1)
<b>Specific Volume (ft<sup>3</sup>/lb)</b>	: 6.0241
<b>Gas Density (lb/ft<sup>3</sup>)</b>	: 0.166

## Section 10. Stability and reactivity

<b>Stability and reactivity</b>	: The product is stable.
<b>Incompatibility with various substances</b>	: Extremely reactive or incompatible with the following materials: oxidizing materials.
<b>Hazardous decomposition products</b>	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
<b>Hazardous polymerization</b>	: Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Toxicity data

#### Product/ingredient name

chloroethane

#### Result

TDLo Oral  
LC50 Inhalation  
Vapor  
LC50 Inhalation  
Vapor  
LC50 Inhalation  
Vapor

#### Species

Rat  
Rat  
  
Rat  
  
Rat

#### Dose

250 mg/kg  
152 g/m<sup>3</sup>  
  
152 g/m<sup>3</sup>  
  
150000 mg/m<sup>3</sup>

#### Exposure

-  
2 hours  
  
10 minutes  
  
2 hours

**IDLH** : 3800 ppm

**Chronic effects on humans** : **CARCINOGENIC EFFECTS:** Classified A3 (Proven for animals.) by ACGIH, 3 (Possible for humans.) by European Union. 3 (Not classifiable for humans.) by IARC. May cause damage to the following organs: kidneys, the nervous system, liver, mucous membranes, cardiovascular system, upper respiratory tract, skin, eyes, central nervous system (CNS).

**Other toxic effects on humans** : No specific information is available in our database regarding the other toxic effects of this material to humans.

### Specific effects

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

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

**Reproduction toxicity** : No known significant effects or critical hazards.

## Section 12. Ecological information

### Aquatic ecotoxicity

Not available.

**Products of degradation** : Products of degradation: carbon oxides (CO, CO<sub>2</sub>) and water, halogenated compounds.

**Environmental fate** : Not available.



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

**Toxicity to the environment** : Not available.


## Section 13. Disposal considerations

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

## Section 14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
<b>DOT Classification</b>	UN1037	ETHYL CHLORIDE	2.1	Not applicable (gas).		<p><b><u>Reportable quantity</u></b> 100 lbs. (45.4 kg)</p> <p><b><u>Limited quantity</u></b> Yes.</p> <p><b><u>Packaging instruction</u></b> <b>Passenger aircraft</b> Quantity limitation: Forbidden.</p> <p><b><u>Cargo aircraft</u></b> Quantity limitation: 150 kg</p> <p><b><u>Special provisions</u></b> B77, T50</p>
<b>TDG Classification</b>	UN1037	ETHYL CHLORIDE	2.1	Not applicable (gas).		<p><b><u>Explosive Limit and Limited Quantity Index</u></b> 0.125</p> <p><b><u>ERAP Index</u></b> 3000</p> <p><b><u>Passenger Carrying Road or Rail Index</u></b> Forbidden</p>

## Ethyl Chloride

<b>Mexico Classification</b>	UN1037	ETHYL CHLORIDE	2.1	Not applicable (gas).		-
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“Refer to CFR 49 (or authority having jurisdiction) to determine the information required for shipment of the product.”

## Section 15. Regulatory information

### United States

- U.S. Federal regulations**
- TSCA 8(a) CDR Exempt/Partial exemption:** Not determined
  - United States inventory (TSCA 8b):** This material is listed or exempted.
  - SARA 302/304:** No products were found.
  - SARA 311/312 Hazards identification:** Fire hazard, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard
  - Clean Water Act (CWA) 307:** chloroethane
  - Clean Water Act (CWA) 311:** No products were found.

**Clean Air Act (CAA) 112 regulated flammable substances:** chloroethane

**Clean Air Act (CAA) 112 regulated toxic substances:** No products were found.

### SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
<b>Form R - Reporting requirements</b>	: Ethyl Chloride	75-00-3	100
<b>Supplier notification</b>	: Ethyl Chloride	75-00-3	100

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

- State regulations**
- Connecticut Carcinogen Reporting:** This material is not listed.
  - Connecticut Hazardous Material Survey:** This material is not listed.
  - Florida substances:** This material is not listed.
  - Illinois Chemical Safety Act:** This material is not listed.
  - Illinois Toxic Substances Disclosure to Employee Act:** This material is not listed.
  - Louisiana Reporting:** This material is not listed.
  - Louisiana Spill:** This material is not listed.
  - Massachusetts Spill:** This material is not listed.
  - Massachusetts Substances:** This material is listed.
  - Michigan Critical Material:** This material is not listed.
  - Minnesota Hazardous Substances:** This material is not listed.
  - New Jersey Hazardous Substances:** This material is listed.
  - New Jersey Spill:** This material is not listed.
  - New Jersey Toxic Catastrophe Prevention Act:** This material is not listed.
  - New York Acutely Hazardous Substances:** This material is listed.
  - New York Toxic Chemical Release Reporting:** This material is not listed.
  - Pennsylvania RTK Hazardous Substances:** This material is listed.
  - Rhode Island Hazardous Substances:** This material is not listed.

- California Prop. 65**
- WARNING:** This product contains a chemical known to the State of California to cause cancer.

<u>Ingredient name</u>	<u>Cancer</u>	<u>Reproductive</u>	<u>No significant risk level</u>	<u>Maximum acceptable dosage level</u>
Ethyl Chloride	Yes.	No.	Yes.	No.

### Canada

- WHMIS (Canada)**
- Class A: Compressed gas.
  - Class B-1: Flammable gas.

**CEPA Toxic substances:** This material is not listed.  
**Canadian ARET:** This material is not listed.  
**Canadian NPRI:** This material is listed.  
**Alberta Designated Substances:** This material is not listed.  
**Ontario Designated Substances:** This material is not listed.  
**Quebec Designated Substances:** This material is not listed.

Section 16. Other information

United States

**Label requirements** : FLAMMABLE GAS.  
MAY CAUSE FLASH FIRE.  
MAY CAUSE EYE AND SKIN IRRITATION.  
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.  
CONTENTS UNDER PRESSURE.

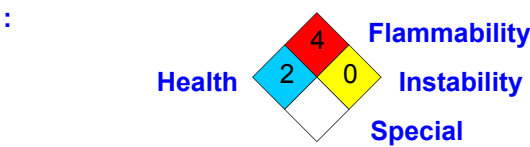
Canada

**Label requirements** : Class A: Compressed gas.  
Class B-1: Flammable gas.

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

Health	*	2
Flammability		4
Physical hazards		0

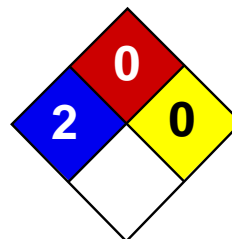
National Fire Protection  
Association (U.S.A.)



[Notice to reader](#)

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

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



Health	2
Fire	0
Reactivity	0
Personal Protection	H

## Material Safety Data Sheet

### Chloroform MSDS

#### Section 1: Chemical Product and Company Identification

**Product Name:** Chloroform

**Catalog Codes:** SLC1888, SLC5044

**CAS#:** 67-66-3

**RTECS:** FS9100000

**TSCA:** TSCA 8(b) inventory: Chloroform

**CI#:** Not available.

**Synonym:** Trichloromethane; Methane, trichlor-

**Chemical Name:** Chloroform

**Chemical Formula:** CHCl<sub>3</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
Chloroform	67-66-3	100

**Toxicological Data on Ingredients:** Chloroform: ORAL (LD50): Acute: 695 mg/kg [Rat]. 36 mg/kg [Mouse]. 820 mg/kg [Guinea pig]. DERMAL (LD50): Acute: >20000 mg/kg [Rabbit]. VAPOR (LC50): Acute: 47702 mg/m 4 hours [Rat].

#### 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: Classified + (Proven.) by NIOSH. Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. 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 kidneys, liver, heart. 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:** 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:** 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:** May explode if it comes in contact with aluminum powder, lithium, perchlorate, pentoxide, bis(dimethylamino)dimethylstannane, potassium, potassium-sodium alloy, sodium (or sodium hydroxide or sodium methoxide), and methanol

## 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. 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 metals, alkalis.

**Storage:** Keep container tightly closed. Keep container in a cool, well-ventilated area. 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 workstation 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: 10 (ppm) [Australia] Inhalation TWA: 2 (ppm) from OSHA (PEL) [United States] Inhalation STEL: 9.78 (mg/m3) from NIOSH Inhalation STEL: 2 (ppm) from NIOSH Inhalation TWA: 9.78 (mg/m3) from OSHA (PEL) [United States] Inhalation TWA: 10 (ppm) from ACGIH (TLV) [United States] [1999] Inhalation TWA: 2 (ppm) [United Kingdom (UK)] Inhalation TWA: 9.9 (mg/m3) [United Kingdom (UK)] Inhalation Consult local authorities for acceptable exposure limits.

## Section 9: Physical and Chemical Properties

**Physical state and appearance:** Liquid.

**Odor:** Pleasant. Sweetish. Etheric. Non-irritating

**Taste:** Burning. Sweet.

**Molecular Weight:** 119.38 g/mole

**Color:** Colorless. Clear

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

**Boiling Point:** 61°C (141.8°F)

**Melting Point:** -63.5°C (-82.3°F)

**Critical Temperature:** 263.33°C (506°F)

**Specific Gravity:** 1.484 (Water = 1)

**Vapor Pressure:** 21.1 kPa (@ 20°C)

**Vapor Density:** 4.36 (Air = 1)

**Volatility:** Not available.

**Odor Threshold:** 85 ppm

**Water/Oil Dist. Coeff.:** The product is more soluble in oil; log(oil/water) = 2

**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:** Incompatible materials, Light

**Incompatibility with various substances:** Reactive with metals, alkalis.

**Corrosivity:** Non-corrosive in presence of glass.

**Special Remarks on Reactivity:** Light Sensitive. Incompatible with triisopropyl phosphine, acetone, disilane, fluorine, strong bases and reactive metals (aluminum, magnesium in powdered form), light.

**Special Remarks on Corrosivity:** It will attack some forms of plastics, rubber, and coatings.

**Polymerization:** Will not occur.

## Section 11: Toxicological Information

**Routes of Entry:** Absorbed through skin. 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): 36 mg/kg [Mouse]. Acute dermal toxicity (LD50): >20000 mg/kg [Rabbit]. Acute toxicity of the vapor (LC50): 47702 mg/m 4 hours [Rat]. 3

**Chronic Effects on Humans:** CARCINOGENIC EFFECTS: Classified + (Proven.) by NIOSH. Classified A3 (Proven for animal.) by ACGIH, 2B (Possible for human.) by IARC. Classified 2 (Some evidence.) by NTP. MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast. May cause damage to the following organs: kidneys, liver, heart.

**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:** Not available.

**Special Remarks on Chronic Effects on Humans:** May affect genetic material (possible mutagen) and cause adverse reproductive effects(embryotoxicity and fetotoxicity) Suspected carcinogen (tumorigenic) and teratogen based on animal data. 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 and may cause chemical burns. Eye: Causes eye irritation, burning pain and reversible injury to corneal epithelium. Inhalation: Causes irritation of the respiratory system (mucous membranes). May affect behavior/Nervous system (CNS depressant, fatigue, dizziness, nervousness, giddiness, euphoria, loss of coordination and judgement, weakness, hallucinations, muscle contraction/spasticity, general anesthetic, spastic paralysis, headache), anorexia (neurological and gastrointestinal symptoms resembling chronic alcoholism), and possibly coma and death. May affect the liver, kidneys and gastrointestinal tract (nausea, vomiting). Ingestion: Causes gastrointestinal tract irritation (nausea, vomiting). May affect the liver, urinary system (kidneys), respiration, behavior/nervous system (symptoms similar to inhalation),and heart. Chronic Potential Health Effects: Inhalation: Prolonged or repeated inhalation may affect the liver (hepatitis, jaundice, hepatocellular necrosis), metabolism (weight loss), respiration (fibrosis, pneumoconiosis), behavior/central nervous system (symptoms similar to acute inhalation), blood, musculoskeletal system, and kidneys. Ingestion: Prolonged or repeated ingestion may affect the liver, kidneys, metabolism (weight loss), endocrine system (spleen), blood (changes in cell count).

## Section 12: Ecological Information

**Ecotoxicity:** Ecotoxicity in water (LC50): 43.8 mg/l 96 hours [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 as toxic as 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 6.1: Poisonous material.

**Identification:** : Chloroform UNNA: UN1888 PG: III

**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: Chloroform California prop. 65 (no significant risk level): Chloroform: 0.02 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: Chloroform New York release reporting list: Chloroform Rhode Island RTK hazardous substances: Chloroform Pennsylvania RTK: Chloroform Massachusetts RTK: Chloroform New Jersey: Chloroform California Director's List of Hazardous Substances (8 CCR 339): Chloroform Tennessee: Chloroform TSCA 8(b) inventory: Chloroform TSCA 8(d) H and S data reporting: Chloroform: effective: 6/1/87; sunset: 6/1/97 SARA 302/304/311/312 extremely hazardous substances: Chloroform SARA 313 toxic chemical notification and release reporting: Chloroform CERCLA: Hazardous substances.: Chloroform: 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 D-1A: Material causing immediate and serious toxic effects (VERY TOXIC). CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

**DSCL (EEC):** R20/22- Harmful by inhalation and if swallowed. R38- Irritating to skin. R40- Possible risks of irreversible effects. S36/37- Wear suitable protective clothing and gloves.

### HMIS (U.S.A.):

**Health Hazard:** 2

**Fire Hazard:** 0

**Reactivity:** 0

**Personal Protection:** h

### 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. Splash goggles.

## Section 16: Other Information

**References:** Not available.

**Other Special Considerations:** Not available.

**Created:** 10/10/2005 08:16 PM

**Last Updated:** 05/21/2013 12:00 PM

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# Material Safety Data Sheet



Methyl Chloride (R40)

## Section 1. Chemical product and company identification

<b>Product name</b>	: Methyl Chloride (R40)
<b>Supplier</b>	: AIRGAS INC., on behalf of its subsidiaries 259 North Radnor-Chester Road Suite 100 Radnor, PA 19087-5283 1-610-687-5253
<b>Product use</b>	: Synthetic/Analytical chemistry.
<b>Synonym</b>	: Methane, chloro-; Artic; Chloromethane; Freon 40; Monochloromethane; CH <sub>3</sub> Cl; Chloor-methaan; Chlor-methan; Chlorure de methyle; Clorometano; Cloruro di metile; Methylchlorid; Metylu chlorek; R 40; Rcra waste number U045; UN 1063; Refrigerant R40
<b>MSDS #</b>	: 001036
<b>Date of Preparation/ Revision</b>	: 11/13/2013.
<b>In case of emergency</b>	: 1-866-734-3438

## Section 2. Hazards identification

<b>Physical state</b>	: Gas. [COLORLESS GAS WITH A FAINT, SWEET ODOR WHICH IS NOT NOTICED AT DANGEROUS CONCENTRATIONS [NOTE: SHIPPED AS A LIQUEFIED COMPRESSED GAS.]
<b>Emergency overview</b>	: WARNING! FLAMMABLE GAS. MAY CAUSE FLASH FIRE. MAY BE HARMFUL IF INHALED OR SWALLOWED. MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA. CONTENTS UNDER PRESSURE. Keep away from heat, sparks and flame. Do not puncture or incinerate container. Do not ingest. May cause target organ damage, based on animal data. Use only with adequate ventilation. Wash thoroughly after handling. Keep container closed. Contact with rapidly expanding gases can cause frostbite.
<b>Target organs</b>	: May cause damage to the following organs: kidneys, the reproductive system, liver, skin, central nervous system (CNS).
<b>Routes of entry</b>	: Inhalation
<b>Potential acute health effects</b>	
<b>Eyes</b>	: Contact with rapidly expanding gas may cause burns or frostbite.
<b>Skin</b>	: Contact with rapidly expanding gas may cause burns or frostbite.
<b>Inhalation</b>	: Acts as a simple asphyxiant.
<b>Ingestion</b>	: Ingestion is not a normal route of exposure for gases
<b>Potential chronic health effects</b>	
<b>Target organs</b>	: May cause damage to the following organs: kidneys, the reproductive system, liver, skin, central nervous system (CNS).
<b>Medical conditions aggravated by over-exposure</b>	: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

## Section 3. Composition, Information on Ingredients

<u>Name</u>	<u>CAS number</u>	<u>% Volume</u>	<u>Exposure limits</u>
Methyl Chloride (R40)	74-87-3	100	<p><b>ACGIH TLV (United States, 3/2012).</b>  <b>Absorbed through skin.</b>            TWA: 50 ppm 8 hours.            TWA: 103 mg/m<sup>3</sup> 8 hours.            STEL: 100 ppm 15 minutes.            STEL: 207 mg/m<sup>3</sup> 15 minutes.</p> <p><b>OSHA PEL 1989 (United States, 3/1989).</b>            TWA: 50 ppm 8 hours.            TWA: 105 mg/m<sup>3</sup> 8 hours.            STEL: 100 ppm 15 minutes.            STEL: 210 mg/m<sup>3</sup> 15 minutes.</p> <p><b>OSHA PEL Z2 (United States, 11/2006).</b>            TWA: 100 ppm 8 hours.            CEIL: 200 ppm            AMP: 300 ppm 5 minutes.</p>

## Section 4. First aid measures

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

<b>Eye contact</b>	: Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.
<b>Skin contact</b>	: In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. To avoid the risk of static discharges and gas ignition, soak contaminated clothing thoroughly with water before removing it. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.
<b>Frostbite</b>	: Try to warm up the frozen tissues and seek medical attention.
<b>Inhalation</b>	: Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.
<b>Ingestion</b>	: As this product is a gas, refer to the inhalation section.

## Section 5. Fire-fighting measures

<b>Flammability of the product</b>	: Flammable.
<b>Auto-ignition temperature</b>	: 632.22°C (1170°F)
<b>Flash point</b>	: Closed cup: -45.56°C (-50°F).
<b>Flammable limits</b>	: Lower: 8.1% Upper: 17.2%
<b>Products of combustion</b>	: Decomposition products may include the following materials: carbon dioxide carbon monoxide halogenated compounds carbonyl halides
<b>Fire hazards in the presence of various substances</b>	: Extremely flammable in the presence of the following materials or conditions: open flames, sparks and static discharge and oxidizing materials.
<b>Fire-fighting media and instructions</b>	: In case of fire, use water spray (fog), foam or dry chemical.

In case of fire, allow gas to burn if flow cannot be shut off immediately. Apply water from a safe distance to cool container and protect surrounding area. If involved in fire, shut off flow immediately if it can be done without risk.

Contains gas under pressure. Flammable gas. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion.

**Special protective equipment for fire-fighters**

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

**Section 6. Accidental release measures****Personal precautions**

- : Immediately contact emergency personnel. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Shut off gas supply if this can be done safely. Isolate area until gas has dispersed.

**Environmental precautions**

- : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

**Methods for cleaning up**

- : Immediately contact emergency personnel. Stop leak if without risk. Use spark-proof tools and explosion-proof equipment. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

**Section 7. Handling and storage****Handling**

- : Use only with adequate ventilation. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling. Do not puncture or incinerate container. Use equipment rated for cylinder pressure. Close valve after each use and when empty. Do not ingest. Keep container closed. Keep away from heat, sparks and flame. To avoid fire, eliminate ignition sources. Protect cylinders from physical damage; do not drag, roll, slide, or drop. Use a suitable hand truck for cylinder movement.

**Storage**

- : 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). Segregate from oxidizing materials. Cylinders should be stored upright, with valve protection cap in place, and firmly secured to prevent falling or being knocked over. Cylinder temperatures should not exceed 52 °C (125 °F).

**Section 8. Exposure controls/personal protection****Engineering controls**

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

**Personal protection****Eyes**

- : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts.

**Skin**

- : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

**Respiratory**

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

The applicable standards are (US) 29 CFR 1910.134 and (Canada) Z94.4-93

**Hands**

- : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

**Personal protection in case of a large spill**

- : Self-contained breathing apparatus (SCBA) should be used to avoid inhalation of the product.

**Product name**

## Methyl Chloride (R40)

chloromethane

**ACGIH TLV (United States, 3/2012). Absorbed through skin.**

TWA: 50 ppm 8 hours.

TWA: 103 mg/m<sup>3</sup> 8 hours.

STEL: 100 ppm 15 minutes.

STEL: 207 mg/m<sup>3</sup> 15 minutes.

**OSHA PEL 1989 (United States, 3/1989).**

TWA: 50 ppm 8 hours.

TWA: 105 mg/m<sup>3</sup> 8 hours.

STEL: 100 ppm 15 minutes.

STEL: 210 mg/m<sup>3</sup> 15 minutes.

**OSHA PEL Z2 (United States, 11/2006).**

TWA: 100 ppm 8 hours.

CEIL: 200 ppm

AMP: 300 ppm 5 minutes.

Consult local authorities for acceptable exposure limits.

## Section 9. Physical and chemical properties

<b>Molecular weight</b>	: 50.49 g/mole
<b>Molecular formula</b>	: C-H3-Cl
<b>Boiling/condensation point</b>	: -24.4°C (-11.9°F)
<b>Melting/freezing point</b>	: -97.8°C (-144°F)
<b>Critical temperature</b>	: 143.7°C (290.7°F)
<b>Vapor pressure</b>	: 58.7 (psig)
<b>Vapor density</b>	: 1.8 (Air = 1)
<b>Specific Volume (ft<sup>3</sup>/lb)</b>	: 7.5188
<b>Gas Density (lb/ft<sup>3</sup>)</b>	: 0.133

## Section 10. Stability and reactivity

<b>Stability and reactivity</b>	: The product is stable.
<b>Incompatibility with various substances</b>	: Extremely reactive or incompatible with the following materials: oxidizing materials.
<b>Hazardous decomposition products</b>	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
<b>Hazardous polymerization</b>	: Under normal conditions of storage and use, hazardous polymerization will not occur.

## Section 11. Toxicological information

### Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
chloromethane	LD50 Oral	Rat	1800 mg/kg	-
	LC50 Inhalation	Rat	5300 mg/m <sup>3</sup>	4 hours
	Vapor			
	LC50 Inhalation	Rat	5300 mg/m <sup>3</sup>	4 hours
	Gas.			
	LC50 Inhalation	Mouse	2200 ppm	6 hours
	Gas.			

**IDLH** : 2000 ppm

**Chronic effects on humans** : **CARCINOGENIC EFFECTS:** Classified + (Proven.) by NIOSH. Classified 3 (Possible for humans.) by European Union. A4 (Not classifiable for humans or animals.) by ACGIH, 3 (Not classifiable for humans.) by IARC.  
May cause damage to the following organs: kidneys, the reproductive system, liver, skin, central nervous system (CNS).

**Other toxic effects on humans** : No specific information is available in our database regarding the other toxic effects of this material to humans.

### Specific effects



**Methyl Chloride (R40)**

**Carcinogenic effects** : No known significant effects or critical hazards.  
**Mutagenic effects** : No known significant effects or critical hazards.  
**Reproduction toxicity** : No known significant effects or critical hazards.

**Section 12. Ecological information****Aquatic ecotoxicity**


Product/ingredient name	Test	Result	Species	Exposure
chloromethane	-	Acute LC50 550000 µg/l Fresh water	Fish - Bluegill - Lepomis macrochirus - 33 to 75 mm	96 hours
	-	Acute LC50 270000 µg/l Marine water	Fish - Inland silverside - Menidia beryllina - 40 to 100 mm	96 hours

**Products of degradation** : Products of degradation: carbon oxides (CO, CO<sub>2</sub>) and water, halogenated compounds.  
**Environmental fate** : Not available.  
**Environmental hazards** : No known significant effects or critical hazards.  
**Toxicity to the environment** : Not available.



**Section 13. Disposal considerations**

Product removed from the cylinder must be disposed of in accordance with appropriate Federal, State, local regulation. Return cylinders with residual product to Airgas, Inc. Do not dispose of locally.

**Section 14. Transport information**

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
<b>DOT Classification</b>	UN1063	METHYL CHLORIDE, OR REFRIGERANT GAS R 40	2.1	Not applicable (gas).		<b>Reportable quantity</b> 100 lbs. (45.4 kg)  <b>Limited quantity</b> Yes.  <b>Packaging instruction</b> <b>Passenger aircraft</b> Quantity limitation: 5 kg  <b>Cargo aircraft</b> Quantity limitation: 100 kg  <b>Special provisions</b> T50

**Methyl Chloride (R40)**

<b>TDG Classification</b>	UN1063	METHYL CHLORIDE; OR REFRIGERANT GAS R 40	2.1	Not applicable (gas).		<b><u>Explosive Limit and Limited Quantity Index</u></b> 0.125  <b><u>ERAP Index</u></b> 3000  <b><u>Passenger Carrying Ship Index</u></b> Forbidden  <b><u>Passenger Carrying Road or Rail Index</u></b> Forbidden
<b>Mexico Classification</b>	UN1063	METHYL CHLORIDE, OR REFRIGERANT GAS R 40	2.1	Not applicable (gas).		-

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

## Section 15. Regulatory information

### United States

#### U.S. Federal regulations

: TSCA 8(a) CDR Exempt/Partial exemption: Not determined

**United States inventory (TSCA 8b):** This material is listed or exempted.

**SARA 302/304/311/312 extremely hazardous substances:** No products were found.

**SARA 302/304 emergency planning and notification:** No products were found.

**SARA 302/304/311/312 hazardous chemicals:** chloromethane

**SARA 311/312 MSDS distribution - chemical inventory - hazard identification:**  
chloromethane: Fire hazard, Sudden release of pressure, Immediate (acute) health hazard, Delayed (chronic) health hazard

**Clean Water Act (CWA) 307:** chloromethane

**Clean Water Act (CWA) 311:** No products were found.

**Clean Air Act (CAA) 112 regulated flammable substances:** No products were found.

**Clean Air Act (CAA) 112 regulated toxic substances:** chloromethane

### SARA 313

	<u>Product name</u>	<u>CAS number</u>	<u>Concentration</u>
<b>Form R - Reporting requirements</b>	: Methyl Chloride (R40)	74-87-3	100
<b>Supplier notification</b>	: Methyl Chloride (R40)	74-87-3	100

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

### State regulations

: **Connecticut Carcinogen Reporting:** This material is not listed.

**Connecticut Hazardous Material Survey:** This material is not listed.

**Florida substances:** This material is not listed.

**Illinois Chemical Safety Act:** This material is not listed.

**Illinois Toxic Substances Disclosure to Employee Act:** This material is not listed.

**Louisiana Reporting:** This material is not listed.

**Louisiana Spill:** This material is not listed.

Methyl Chloride (R40)

**Massachusetts Spill:** This material is not listed.  
**Massachusetts Substances:** This material is listed.  
**Michigan Critical Material:** This material is not listed.  
**Minnesota Hazardous Substances:** This material is not listed.  
**New Jersey Hazardous Substances:** This material is listed.  
**New Jersey Spill:** This material is not listed.  
**New Jersey Toxic Catastrophe Prevention Act:** This material is listed.  
**New York Acutely Hazardous Substances:** This material is listed.  
**New York Toxic Chemical Release Reporting:** This material is not listed.  
**Pennsylvania RTK Hazardous Substances:** This material is listed.  
**Rhode Island Hazardous Substances:** This material is not listed.

**California Prop. 65** : **WARNING:** This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

<u>Ingredient name</u>	<u>Cancer</u>	<u>Reproductive</u>	<u>No significant risk level</u>	<u>Maximum acceptable dosage level</u>
Methyl Chloride (R40)	No.	Yes.	No.	No.

Canada

**WHMIS (Canada)** : Class A: Compressed gas.  
Class B-1: Flammable gas.  
Class B-6: Reactive flammable material  
Class D-2A: Material causing other toxic effects (Very toxic).  
**CEPA Toxic substances:** This material is not listed.  
**Canadian ARET:** This material is not listed.  
**Canadian NPRI:** This material is listed.  
**Alberta Designated Substances:** This material is not listed.  
**Ontario Designated Substances:** This material is not listed.  
**Quebec Designated Substances:** This material is not listed.

Section 16. Other information

United States

**Label requirements** : FLAMMABLE GAS.  
MAY CAUSE FLASH FIRE.  
MAY BE HARMFUL IF INHALED OR SWALLOWED.  
MAY CAUSE TARGET ORGAN DAMAGE, BASED ON ANIMAL DATA.  
CONTENTS UNDER PRESSURE.

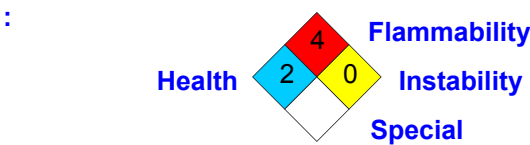
Canada

**Label requirements** : Class A: Compressed gas.  
Class B-1: Flammable gas.  
Class B-6: Reactive flammable material  
Class D-2A: Material causing other toxic effects (Very toxic).

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

Health	*	2
Flammability		4
Physical hazards		0

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



**[Notice to reader](#)**

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

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

## Material Safety Data Sheet

Version 4.0

Revision Date 12/24/2012

Print Date 05/28/2014

## 1. PRODUCT AND COMPANY IDENTIFICATION

Product name : cis-Dichloroethylene

Product Number : 48597

Brand : Supelco

Supplier : Sigma-Aldrich  
3050 Spruce Street  
SAINT LOUIS MO 63103  
USA

Telephone : +1 800-325-5832

Fax : +1 800-325-5052

Emergency Phone # (For both supplier and manufacturer) : (314) 776-6555

Preparation Information : Sigma-Aldrich Corporation  
Product Safety - Americas Region  
1-800-521-8956

## 2. HAZARDS IDENTIFICATION

## Emergency Overview

## OSHA Hazards

Flammable liquid

## Target Organs

Central nervous system, Liver, Kidney

## GHS Classification

Flammable liquids (Category 2)

Acute toxicity, Inhalation (Category 4)

Acute aquatic toxicity (Category 3)

## GHS Label elements, including precautionary statements

Pictogram



Signal word

Danger

Hazard statement(s)

H225

Highly flammable liquid and vapour.

H332

Harmful if inhaled.

H402

Harmful to aquatic life.

Precautionary statement(s)

P210

Keep away from heat/sparks/open flames/hot surfaces. - No smoking.

## HMIS Classification

Health hazard: 1

Chronic Health Hazard: \*

Flammability: 3

Physical hazards: 1

## NFPA Rating

Health hazard: 2

Fire: 3

**Reactivity Hazard:** 0

#### Potential Health Effects

**Inhalation** May be harmful if inhaled. May cause respiratory tract irritation.  
**Skin** May be harmful if absorbed through skin. May cause skin irritation.  
**Eyes** May cause eye irritation.  
**Ingestion** May be harmful if swallowed.

---

### 3. COMPOSITION/INFORMATION ON INGREDIENTS

Formula : C<sub>2</sub>H<sub>2</sub>Cl<sub>2</sub>  
Molecular Weight : 96.94 g/mol

Component		Concentration
<b>cis-Dichloroethylene</b>		
CAS-No.	156-59-2	-
EC-No.	205-859-7	
Index-No.	602-026-00-3	

---

### 4. FIRST AID MEASURES

#### General advice

Consult a physician. Show this safety data sheet to the doctor in attendance. Move out of dangerous area.

#### If inhaled

If breathed in, move person into fresh air. If not breathing, give artificial respiration. Consult a physician.

#### In case of skin contact

Wash off with soap and plenty of water. Consult a physician.

#### In case of eye contact

Flush eyes with water as a precaution.

#### If swallowed

Do NOT induce vomiting. Never give anything by mouth to an unconscious person. Rinse mouth with water. Consult a physician.

---

### 5. FIREFIGHTING MEASURES

#### Conditions of flammability

Flammable in the presence of a source of ignition when the temperature is above the flash point. Keep away from heat/sparks/open flame/hot surface. No smoking.

#### Suitable extinguishing media

Use water spray, alcohol-resistant foam, dry chemical or carbon dioxide.

#### Special protective equipment for firefighters

Wear self contained breathing apparatus for fire fighting if necessary.

#### Hazardous combustion products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

#### Further information

Use water spray to cool unopened containers.

---

### 6. ACCIDENTAL RELEASE MEASURES

#### Personal precautions

Use personal protective equipment. Avoid breathing vapors, mist or gas. Ensure adequate ventilation. Remove all sources of ignition. Evacuate personnel to safe areas. Beware of vapours accumulating to form explosive concentrations. Vapours can accumulate in low areas.

#### Environmental precautions

Prevent further leakage or spillage if safe to do so. Do not let product enter drains. Discharge into the environment must be avoided.

### Methods and materials for containment and cleaning up

Contain spillage, and then collect with an electrically protected vacuum cleaner or by wet-brushing and place in container for disposal according to local regulations (see section 13).

---

## 7. HANDLING AND STORAGE

### Precautions for safe handling

Avoid contact with skin and eyes. Avoid inhalation of vapour or mist.

Use explosion-proof equipment. Keep away from sources of ignition - No smoking. Take measures to prevent the build up of electrostatic charge.

### Conditions for safe storage

Keep container tightly closed in a dry and well-ventilated place. Containers which are opened must be carefully resealed and kept upright to prevent leakage.

Recommended storage temperature: 2 - 8 °C

Handle and store under inert gas. Air and moisture sensitive. Light sensitive.

---

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

### Components with workplace control parameters

Components	CAS-No.	Value	Control parameters	Basis
cis-Dichloroethylene	156-59-2	TWA	200 ppm	USA. ACGIH Threshold Limit Values (TLV)
Remarks	Central Nervous System impairment Eye irritation			

### Personal protective equipment

#### Respiratory protection

Where risk assessment shows air-purifying respirators are appropriate use a full-face respirator with multi-purpose combination (US) or type AXBEK (EN 14387) respirator cartridges as a backup to engineering controls. If the respirator is the sole means of protection, use a full-face supplied air respirator. Use respirators and components tested and approved under appropriate government standards such as NIOSH (US) or CEN (EU).

#### Hand protection

Handle with gloves. Gloves must be inspected prior to use. Use proper glove removal technique (without touching glove's outer surface) to avoid skin contact with this product. Dispose of contaminated gloves after use in accordance with applicable laws and good laboratory practices. Wash and dry hands.

#### Eye protection

Face shield and safety glasses Use equipment for eye protection tested and approved under appropriate government standards such as NIOSH (US) or EN 166(EU).

#### Skin and body protection

Complete suit protecting against chemicals, Flame retardant antistatic protective clothing, The type of protective equipment must be selected according to the concentration and amount of the dangerous substance at the specific workplace.

#### Hygiene measures

Handle in accordance with good industrial hygiene and safety practice. Wash hands before breaks and at the end of workday.

---

## 9. PHYSICAL AND CHEMICAL PROPERTIES

### Appearance

Form	liquid
Colour	light yellow

### Safety data

pH	no data available
----	-------------------

Melting point/freezing point	-80.0 °C (-112.0 °F)
Boiling point	60.0 - 61.0 °C (140.0 - 141.8 °F)
Flash point	6.0 °C (42.8 °F) - closed cup
Ignition temperature	no data available
Auto-ignition temperature	no data available
Lower explosion limit	no data available
Upper explosion limit	no data available
Vapour pressure	no data available
Density	1.28 g/cm3
Water solubility	no data available
Partition coefficient: n-octanol/water	no data available
Relative vapor density	no data available
Odour	no data available
Odour Threshold	no data available
Evaporation rate	no data available

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## 10. STABILITY AND REACTIVITY

### Chemical stability

Stable under recommended storage conditions.

### Possibility of hazardous reactions

Vapours may form explosive mixture with air.

### Conditions to avoid

Heat, flames and sparks. Extremes of temperature and direct sunlight.

### Materials to avoid

Oxidizing agents

### Hazardous decomposition products

Hazardous decomposition products formed under fire conditions. - Carbon oxides, Hydrogen chloride gas

Other decomposition products - no data available

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## 11. TOXICOLOGICAL INFORMATION

### Acute toxicity

#### Oral LD50

#### Inhalation LC50

LC50 Inhalation - rat - 13700 ppm

Remarks: Behavioral:Somnolence (general depressed activity). Liver:Fatty liver degeneration.

#### Dermal LD50

no data available

#### Other information on acute toxicity

no data available

### Skin corrosion/irritation

no data available

### Serious eye damage/eye irritation

no data available



**Respiratory or skin sensitization**

no data available

**Germ cell mutagenicity**

no data available

**Carcinogenicity**

IARC: No component of this product present at levels greater than or equal to 0.1% is identified as probable, possible or confirmed human carcinogen by IARC.

ACGIH: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by ACGIH.

NTP: No component of this product present at levels greater than or equal to 0.1% is identified as a known or anticipated carcinogen by NTP.

OSHA: No component of this product present at levels greater than or equal to 0.1% is identified as a carcinogen or potential carcinogen by OSHA.

**Reproductive toxicity**

no data available

**Teratogenicity**

no data available

**Specific target organ toxicity - single exposure (Globally Harmonized System)**

no data available

**Specific target organ toxicity - repeated exposure (Globally Harmonized System)**

no data available

**Aspiration hazard**

no data available

**Potential health effects**

<b>Inhalation</b>	May be harmful if inhaled. May cause respiratory tract irritation.
<b>Ingestion</b>	May be harmful if swallowed.
<b>Skin</b>	May be harmful if absorbed through skin. May cause skin irritation.
<b>Eyes</b>	May cause eye irritation.

**Signs and Symptoms of Exposure**

narcosis, To the best of our knowledge, the chemical, physical, and toxicological properties have not been thoroughly investigated.

**Synergistic effects**

no data available

**Additional Information**

RTECS: KV9420000

---

**12. ECOLOGICAL INFORMATION****Toxicity**

no data available

**Persistence and degradability**

no data available

**Bioaccumulative potential**

no data available

**Mobility in soil**

no data available

**PBT and vPvB assessment**

no data available

**Other adverse effects**

An environmental hazard cannot be excluded in the event of unprofessional handling or disposal.

Harmful to aquatic life.

---

**13. DISPOSAL CONSIDERATIONS****Product**

Burn in a chemical incinerator equipped with an afterburner and scrubber but exert extra care in igniting as this material is highly flammable. Offer surplus and non-recyclable solutions to a licensed disposal company. Contact a licensed professional waste disposal service to dispose of this material.

**Contaminated packaging**

Dispose of as unused product.

---

**14. TRANSPORT INFORMATION****DOT (US)**

UN number: 1150 Class: 3 Packing group: II

Proper shipping name: 1,2-Dichloroethylene

Marine Pollutant: No

Poison Inhalation Hazard: No

**IMDG**

UN number: 1150 Class: 3 Packing group: II EMS-No: F-E, S-D

Proper shipping name: 1,2-DICHLOROETHYLENE

Marine Pollutant: No

**IATA**

UN number: 1150 Class: 3 Packing group: II

Proper shipping name: 1,2-Dichloroethylene

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**15. REGULATORY INFORMATION****OSHA Hazards**

Flammable liquid

**SARA 302 Components**

SARA 302: No chemicals in this material are subject to the reporting requirements of SARA Title III, Section 302.

**SARA 313 Components**

SARA 313: This material does not contain any chemical components with known CAS numbers that exceed the threshold (De Minimis) reporting levels established by SARA Title III, Section 313.

**SARA 311/312 Hazards**

Fire Hazard

**Massachusetts Right To Know Components**

cis-Dichloroethylene

CAS-No.  
156-59-2

Revision Date  
1993-04-24

**Pennsylvania Right To Know Components**

cis-Dichloroethylene

CAS-No.  
156-59-2

Revision Date  
1993-04-24

**New Jersey Right To Know Components**

cis-Dichloroethylene

CAS-No.  
156-59-2

Revision Date  
1993-04-24

**California Prop. 65 Components**

This product does not contain any chemicals known to State of California to cause cancer, birth defects, or any other reproductive harm.

## 16. OTHER INFORMATION

### Further information

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## **ATTACHMENT III**

## **Attachment III – Heat Stress / Cold Stress**

### **1.0 HEAT STRESS**

Excessive exposure to a hot environment can bring about a variety of heat-induced disorders. The four main types of heat stress related illnesses: heat rash, heat cramps, heat exhaustion, and heat stroke, are discussed below.

#### **1.1 Heat Rash**

Heat rash also known as prickly heat, is likely to occur in hot, humid environments where sweat is not readily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by an infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin.

#### **1.2 Heat Cramps**

Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. Drinking large quantities of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly thereafter, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs or abdomen, but tired muscles (those used to perform the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours and may be relieved by taking salted liquids by mouth, such as the variety of sports drinks on the market.

**CAUTION SHOULD BE EXERCISED BY PEOPLE WITH HEART PROBLEMS OR THOSE ON LOW SODIUM DIETS WHO WORK IN HOT ENVIRONMENTS. THESE PEOPLE SHOULD CONSULT A PHYSICIAN ABOUT WHAT TO DO UNDER THESE CONDITIONS.**

### 1.3 Heat Exhaustion

Heat exhaustion includes several clinical disorders having symptoms that may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from this condition still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated.

A summary of the key symptoms of heat exhaustion is as follows:

- Clammy skin
- Confusion
- Dizziness
- Fainting
- Fatigue
- Heat Rash
- Light-headedness
- Nausea
- Profuse sweating
- Slurred Speech
- Weak Pulse

In most cases, treatment involves having the victim rest in a cool place and drink plenty of fluids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.

**AS WITH HEAT CRAMPS, CERTAIN PERSONS SHOULD CONSULT WITH THEIR PHYSICIAN ABOUT WHAT TO DO UNDER THESE CONDITIONS.**

## 1.4 Heat Stroke

This is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate. The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105°F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur.

A summary of the key symptoms of heatstroke is as follows:

- Confusion
- Convulsions
- Incoherent Speech
- Staggering Gait
- Unconsciousness
- Sweating stops
- Hot skin, high temperature (yet extremities may feel chilled)

Any person with signs or symptoms of heat stroke requires immediate hospitalization. However, first aid should be immediately administered. This includes moving the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Further treatment at a medical facility should include continuation of the cooling process and the monitoring of complications that often accompany the heat stroke. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

## 1.5 Preparing for the Heat

Humans, to a large extent, are capable of adjusting to heat. This acclimation to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more tolerable.

On the first day of exposure, body temperature, pulse rate, and general discomfort will be higher. With each succeeding day of exposure, all of these responses will gradually decrease, while the sweat rate will increase. When the body does become acclimated to the heat, the worker will find it possible to perform work with less strain and distress.

A gradual exposure to heat gives the body time to become accustomed to higher temperatures, such as those encountered in chemical protective clothing.

## 1.6 Protecting Against Heat Stress

There are several methods that can be used to reduce heat stress:

- Limit duration of work periods
- Use protective clothing with cooling devices
- Enforce the use of the "Buddy System"
- Consume electrolyte solutions prior to suiting up
- Monitor workers for pulse recovery rates, body fluid loss, body weight loss, and excess fatigue
- Screen for heat stress susceptible candidates in your medical surveillance program
- Have all personnel know the signs and symptoms of heat stress



## 2.0 COLD STRESS

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body that have high surface-area-to-volume ratio such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold injury, ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10 degrees Fahrenheit with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at minus 18 degrees Fahrenheit.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

### 2.1 Frostbite

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost Nip or Initial Frostbite: characterized by suddenly blanching or whitening of skin.
- Superficial Frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep Frostbite: tissues are cold, pale, and solid; extremely serious injury.

### 2.2 Hypothermia

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages:

- Shivering
- Apathy, listlessness, sleepiness, and (sometimes rapid cooling of the body to less than 95°F)
- Unconsciousness, glassy stage, slow pulse, and slow respiratory rate
- Freezing of the extremities
- Death

Thermal socks, long cotton or thermal underwear, hard hat liners and other cold weather gear can aid in the prevention of hypothermia. Blankets and warm drinks (other than caffeinated coffee) are also recommended.

Measures shall be taken to keep workers from getting wet, such as issuance of rain gear. Workers whose cloths become wet shall be given the opportunity to dry off and change clothes.

## **ATTACHMENT IV**

## **Attachment IV - Construction Equipment Safety Rules**

### **1.0 ELECTRICAL**

1. Live electrical parts shall be guarded against accidental contact by cabinets, enclosure, location, or guarding. Cabinet covers will be replaced.
2. Working and clear space around electric equipment and distribution boxes will be kept clear and assessable.
3. Circuit breakers, switch boxes, etc. will be legibly marked to indicate their purpose.
4. All 120-volt, single-phase 15- and 20-ampere receptacle outlets on construction sites, which are not a part of the permanent wiring of the building or structure and which are in use by employees, shall have approved ground-fault circuit interrupters for personnel protection. If the prime contractor has not provided this protection with GFCI receptacles at the temporary service drop, employees will ensure portable GFCI protection is provided. (Employers may wish to use assured equipment grounding conductor program in lieu of this GFCI protection.) This requirement is in addition to any other electrical equipment grounding requirement or double insulated protection.
5. All extension cords will be three-wire (grounded) type and designed for hard or extra hard usage (Type S, ST, SO, STO, or SJ, SJO, SJT, SJTO).
6. Ground prongs will not be removed.
7. Cords and strain relief devices/clamps will be in good condition.
8. All lamps for general illumination will have the bulbs protected against breakage.
9. Electrical cords will not suspend temporary lights unless cords and lights are designed for such suspension. Flexible cords used for temporary and portable lights will be designed for hard or extra hard usage.
10. Employees will not work in such close (able to contact) proximity to any part of an electric power circuit unless the circuit is de-energized, grounded, or guarded by insulation.
11. Equipment or circuits that are de-energized will be locked out and tagged out. The tags will plainly identify the equipment or circuits being worked on.

## **2.0 COMPRESSED GAS CYLINDERS**

1. All gas cylinders will have their contents clearly marked on the outside of each cylinder.
2. Cylinders must be transported, stored, and secured in an upright position. They will never be left laying on the ground or floor, nor used as rollers or supports.
3. Cylinder valves must be protected with caps and closed when not in use.
4. All leaking or defective cylinders must be removed from service promptly, tagged as inoperable and placed in an open space removed from the work area.
5. Oxygen cylinders and fittings will be kept away from oil or grease.
6. When cylinders are hoisted, they will be secured in a cradle, sling-board, or pallet. Valve protection caps will not be used for lifting cylinders from one vertical level to another.

## **3.0 LADDERS**

1. A competent person to identify any unsafe conditions will periodically inspect ladders.
2. Those ladders with structural defects will be removed from service, and repaired or replaced.
3. Straight ladders used on other than stable, level, and dry surfaces must be tied off, held, or secured for stability.
4. Portable ladder side rails will extend at least three feet above the upper landing to which the ladder is used to gain access.
5. The top or top step of a stepladder will not be used as a step.

## **4.0 AERIAL LIFTS**

1. Aerial lifts include cherry pickers, extensible boom platforms, aerial ladders, articulating boom platforms, vertical towers, and any combinations of the above.
2. Only authorized and trained persons will operate aerial lifts.
3. Lift controls will be tested each day before use.
4. Safety harness will be worn when elevated in the aerial lift.

5. Lanyards will be attached to the boom or basket.
6. Employees will not belt off to adjacent poles, structures, or equipment while working from an aerial lift.
7. Employees will always stand firmly on the floor of the basket, and will not sit or climb on the edge of the basket.
8. Planks, ladders, or other devices will not be used for work position or additional working height.
9. Brakes will be set and outriggers will be used.
10. The aerial lift truck will not be moved with the boom elevated and employees in the basket, unless the equipment is specifically designed for such.

## **5.0 CRANES**

1. A competent person prior to each use/during use to make sure it is in safe operating condition will inspect all cranes. Also, a certification record of monthly inspections to include date, inspector signature, and crane identifier will be maintained.
2. A thorough annual inspection of hoisting machinery will be made by a competent person, or by a government or private agency, and records maintained.
3. Loads will never be swung over the heads of workers in the area.
4. Employees will never ride hooks, concrete buckets, or other material loads being suspended or moved by cranes.
5. Hand signals to crane operators will be those prescribed by the applicable ANSI standard to the type of crane in use.
6. Tag lines must be used to control loads and keep workers away.
7. Loads, booms, and rigging will be kept at least 10 feet from energized electrical lines rated 50 KV or lower unless the lines are de-energized. For lines rated greater than 50 KV follow OSHA Rules and Regulations, 1926.550(a)(15).
8. Cranes will always be operated on firm, level surfaces, or use mats/pads, particularly for near-capacity lifts.
9. Accessible areas within the swing radius of the rear of the rotating superstructure of the crane, either permanently or temporarily mounted, will be barricaded in such a manner as to prevent employees from being struck or crushed by the crane.

10. If suspended personnel platforms are to be lifted with a crane, reference 1926.550(g) for general and specific requirements.
11. Rigging equipment (chains, slings, wire rope, hooks, other attachments, etc.) will be inspected prior to use on each shift to ensure it is safe. Defective rigging and equipment will be removed from service.
12. Job or shop hooks or other makeshift fasteners using bolts, wire, etc. will not be used.
13. Wire rope shall be taken out of service when one of the following conditions exist:
  - In running ropes, 6 random distributed broken wires in one lay or 3 broken wires in one strand or one lay.
  - Wear of one-third the original diameter of outside individual wires.
  - Kinking, crushing, bird caging, heat damage, or any other damage resulting in distortion of the rope structure.
  - In standing ropes, more than two broken wires in one lay in sections beyond end connections, or more than one broken wire at an end connection.

## **6.0 WELDING and BRAZING**

1. Combustible material will be cleared from the area around cutting or welding operations.
2. Welding helmets and goggles will be worn for eye protection and to prevent flash burns.
3. Eye protection to guard against slag while chipping, grinding and dressing of welds will be worn.
4. Only electrode holders specifically designed for arc welding will be used.
5. All parts subject to electrical current will be fully insulated against the maximum voltage encountered to ground.
6. A ground return cable shall have a safe current carrying capacity equal to, or exceeding, the specified maximum output capacity of the arc-welding unit that it services.
7. Cables, leads, hoses, and connections will be placed so that there are no fire or tripping hazards.

## **7.0 TOOLS**

1. Take special precautions when using power tools.
2. Defective tools will be removed from service.
3. Electric power tools will be the grounded-type or double insulated.
4. Power tools will be turned off and motion stopped before setting tool down.
5. Tools will be disconnected from power source before changing drills, blades or bits, or attempting repair or adjustment. Never leave a running tool unattended.
6. Power saws, table saws, and radial arm saws will have operational blade guards installed and used.
7. Unsafe/defective hand tools will not be used. These include sprung jaws on wrenches, mushroomed head of chisels/punches, and cracked/broken handles of any tool.
8. Portable abrasive grinders will have guards installed covering the upper and back portions of the abrasive wheel. Wheel speed ratings will never be less than the grinder RPM speed.
9. Compressed air will not be used for cleaning purposes except when pressure is reduced to less than 30 psi by regulating or use of a safety nozzle, and then only with effective chip guarding and proper personal protective equipment.
10. Abrasive blasting nozzles will have a valve that must be held open manually.
11. Only trained employees will operate powder-actuated tools.
12. Any employee furnished tools of any nature must meet all OSHA and ANSI requirements.

## **8.0 SAFETY RAILINGS AND OTHER FALL PROTECTION**

1. All open sided floors and platforms six feet or more above adjacent floor/ground level will be guarded by a standard railing (top and mid rail, toeboard if required).
2. A stairway or ladder will be provided at any point of access where there is a break in elevation of 19 inches or more.
3. All stairways of four or more risers or greater than 30 inches high will be guarded by a handrail or stair rails



4. When a floor hole or opening (greater than two inches in its least dimension) is created during a work activity, through which a worker can fall, step into, or material can fall through, a cover or a safety guardrail must be installed immediately.
5. Safety nets will be provided when workplaces are more than 25 feet above the ground, water, or other surfaces where the use of ladders, scaffolds, catch platforms, temporary floors, safety lines, or safety belts, is impractical.
6. Safety harnesses, lanyards, lines, and lifelines may be used in lieu of other fall protection systems to provide the required fall protection.
7. Adjustment of lanyards must provide for not more than a six-foot fall, and all tie off points must be at least waist high.

#### **8.1     *Scaffolds***

1. Scaffolds will be erected, moved, dismantled, or altered only under the supervision of a competent person qualified in scaffold erection, moving, dismantling, or alteration.
2. Standard guardrails (consisting of top-rail and mid-rail) will be installed on all open sides and ends of scaffold platforms and/or work levels more than ten feet above the ground, floor, or lower level.
3. Scaffolds four to ten feet in height with a minimum horizontal dimension in any direction less than 45 inches will have standard railings installed on all open sides/ends.
4. Platforms at all working levels will be fully planked. Planking will be laid tight with no more than one inch space between them, overlap at least 12 inches, and extend over end supports 6 - 12 inches.
5. The front edge of all platforms will be no more than 14 inches from the face of the work, except plastering/lathing may be 18 inches.
6. Mobile scaffolds will be erected no more than a maximum height of four times their minimum base dimension.
7. Scaffolds will not be overloaded beyond their design loadings.
8. Scaffold components should not be used as tie-off/anchor points for fall protection devices.

9. Portable ladders, hook-on ladders, attachable ladders, integral prefabricated scaffold frames, walkways, or direct access from another scaffold or structure will be used for access when platforms are more than two feet above or below a point of access.
10. Cross braces will not be used as a mean of access to scaffolds.
11. Scaffolds will not be erected, used, dismantled, altered, or moved such that they or any conductive material handled on them might come closer to exposed and energized power lines than the following:
  - Three feet from insulated lines of less than 300 volts;
  - Ten feet plus for any other insulated or un-insulated lines.

## **8.2     *Excavations and Trenches***

1. Any excavation or trench five feet or more in depth will be provided cave-in protection through shoring, sloping, benching, or the use of hydraulic shoring, trench shields, or trench boxes.
2. Trenches less than five feet in depth and showing potential of cave-in will also be provided cave-in protection. Specific requirements of each system are dependent upon the soil classification as determined by a competent person.
3. A competent person will inspect each excavation/trench daily prior to start of work, after every rainstorm or other hazard-increasing occurrence, and as needed throughout the shift.
4. Means of egress will be provided in trenches four feet or more in depth so as to require no more than 25 feet of lateral travel for each employee in the trench.
5. Spoil piles and other equipment will be kept at least two feet from the edge of the trench or excavation.

## **9.0     MOTOR VEHICLES AND MECHANIZED EQUIPMENT**

1. All vehicles and equipment will be checked at the beginning of each shift, and during use, to make sure it is in safe operating condition.
2. All equipment left unattended at night adjacent to highways in normal use shall have lights or reflectors, or barricades with lights or reflectors, to identify the location of the equipment.
3. When equipment is stopped or parked, parking brakes shall be set. Equipment on inclines shall have wheels chocked as well as having parking brakes set.

4. Operators shall not use earth-moving or compaction equipment having an obstructed rear view unless vehicle has an audible reverse signal alarm, or is backed only when observer says it is safe to do so.
5. All vehicles shall have in operable condition:
  - Horn (bi-directional equipment)
  - Seats, firmly secured, for the number of persons carried. Passengers must ride in seats.
  - Seat belts properly installed.
  - Service, parking and emergency brake system.
  - All vehicles with cabs will be equipped with windshields with safety glass.
  - All material handling equipment will be equipped with rollover protective structures.

## **10.0 MISCELLANEOUS**

1. All protruding reinforcing steel, onto and into which employees could fall, shall be guarded to eliminate the impalement hazard.
2. Enclosed chutes will be used when material, trash, and debris are dropped more than 20 feet outside the exterior walls of a building. A substantial gate will be provided near the discharge end of the chute, and guardrails at the chute openings into which workers drop material.
3. Only trained employees will service large truck wheels. A cage or other restraining device plus an airline assembly consisting of a clip-on chuck, gauge, and length of hose will be used to inflate any large truck tires.
4. Only trained employees will operate forklifts and other industrial trucks.

# APPENDIX C

## Soil/Materials Management Plan

## **APPENDIX C**

### **SOIL/MATERIALS MANAGEMENT PLAN**

#### **1.1 Soil Screening Methods**

Visual, olfactory and PID soil screening and assessment will be performed under the supervision of a Qualified Environmental Professional and will be reported in the Remedial Closure Report (RCR). Soil screening will be performed during invasive work performed during the remedy and development phases prior to issuance of the Notice of Satisfaction.

#### **1.2 Stockpile Methods**

Excavated soil from suspected areas of contamination (e.g., hot spots, USTs, drains, etc.) will be stockpiled separately and will be segregated from clean soil and construction materials. Stockpiles will be used only when necessary and will be removed as soon as practicable. While stockpiles are in place, they will be inspected daily, and before and after every storm event. Results of inspections will be recorded in a logbook and maintained at the Site and available for inspection by OER. Excavated soils will be stockpiled on, at minimum, double layers of 8-mil minimum sheeting, will be kept covered at all times with appropriately anchored plastic tarps, and will be routinely inspected. Broken or ripped tarps will be promptly replaced.

All stockpile activities will be compliant with applicable laws and regulations. Soil stockpile areas will be appropriately graded to control run-off in accordance with applicable laws and regulations. Stockpiles of excavated soils and other materials shall be located at least of 50 feet from the property boundaries, where possible. Hay bales or equivalent will surround soil stockpiles except for areas where access by equipment is required. Silt fencing and hay bales will be used as needed near catch basins, surface waters and other discharge points.

#### **1.3 Characterization of Excavated Materials**

Soil/fill or other excavated media that is transported off-Site for disposal will be sampled in a manner required by the receiving facility, and in compliance with applicable laws and regulations. Soils proposed for reuse on-Site will be managed as defined in this plan.

## **1.4 Materials Excavation, Load-Out and Departure**

The PE/QEP overseeing the remedial action will:

- oversee remedial work and the excavation and load-out of excavated material;
- ensure that there is a party responsible for the safe execution of invasive and other work performed under this work plan;
- ensure that Site development activities and development-related grading cuts will not interfere with, or otherwise impair or compromise the remedial activities proposed in this RAP;
- ensure that the presence of utilities and easements on the Site has been investigated and that any identified risks from work proposed under this plan are properly addressed by appropriate parties;
- ensure that all loaded outbound trucks are inspected and cleaned if necessary before leaving the Site;
- ensure that all egress points for truck and equipment transport from the Site will be kept clean of Site-derived materials during Site remediation.

Locations where vehicles exit the Site shall be inspected daily for evidence of soil tracking off premises. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to Site-derived materials.

Open and uncontrolled mechanical processing of historical fill and contaminated soil on-Site will not be performed without prior OER approval.

## **1.5 Off-Site Materials Transport**

Loaded vehicles leaving the Site will comply with all applicable materials transportation requirements (including appropriate covering, manifests, and placards) in accordance with applicable laws and regulations, including use of licensed haulers in accordance with 6 NYCRR Part 364. If loads contain wet material capable of causing leakage from trucks, truck liners will be used. Queuing of trucks will be performed on-Site, when possible in order to minimize off Site disturbance. Off-Site queuing will be minimized.

Outbound truck transport routes are in Section 3.8 of the RAP. This routing takes into account the following factors: (a) limiting transport through residential areas and past sensitive sites; (b) use of mapped truck routes; (c) minimizing off-Site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport. To the extent possible, all trucks loaded with Site materials will travel from the Site using these truck routes. Trucks will not stop or idle in the neighborhood after leaving the project Site.

## **1.6 Materials Disposal Off-Site**

The following documentation will be established and reported by the PE/QEP for each disposal destination used in this project to document that the disposal of regulated material exported from the Site conforms with applicable laws and regulations: (1) a letter from the PE/QEP or Applicant to each disposal facility describing the material to be disposed and requesting written acceptance of the material. This letter will state that material to be disposed is regulated material generated at an environmental remediation Site in New York under a governmental remediation program. The letter will provide the project identity and the name and phone number of the PE/QEP or Applicant. The letter will include as an attachment a summary of all chemical data for the material being transported; and (2) a letter from each disposal facility stating it is in receipt of the correspondence (1, above) and is approved to accept the material. These documents will be included in the RCR.

The RCR will include an itemized account of the destination of all material removed from the Site during this remedial action. Documentation associated with disposal of all material will include records and approvals for receipt of the material. This information will be presented in the RCR.

All impacted soil/fill or other waste excavated and removed from the Site will be managed as regulated material and will be disposed in accordance with applicable laws and regulations. Historic fill and contaminated soils taken off-Site will be handled as solid waste and will not be disposed at a Part 360-16 Registration Facility (also known as a Soil Recycling Facility).

Waste characterization will be performed for off-Site disposal in a manner required by the receiving facility and in conformance with its applicable permits. Waste characterization

sampling and analytical methods, sampling frequency, analytical results and QA/QC will be reported in the RCR. A manifest system for off-Site transportation of exported materials will be employed. Manifest information will be reported in the RCR. Hazardous wastes derived from on-Site will be stored, transported, and disposed of in compliance with applicable laws and regulations.

## **1.7 Materials Reuse On-Site**

Soil and fill that is derived from the property that meets the soil cleanup objectives established in this plan may be reused on-Site. The soil cleanup objectives for on-Site reuse are listed in the RAP. “Reuse on-Site” means material that is excavated during the remedy or development, does not leave the property, and is relocated within the same property and on comparable soil/fill material, and addressed pursuant to Engineering Controls. The PE/QEP will ensure that reused materials are segregated from other materials to be exported from the Site and that procedures defined for material reuse in this RAP are followed. The expected location for placement of reused material is shown in the RAP.

Organic matter (wood, roots, stumps, etc.) or other waste derived from clearing and grubbing of the Site will not be buried on-Site. Soil or fill excavated from the site for grading or other purposes will not be reused within a cover soil layer or within landscaping berms.

## **1.8 Demarcation**

After completion of hotspot removal and any other invasive remedial activities, and prior to backfilling, the top of the residual soil/fill will be defined by one of three methods: (1) placement of a demarcation layer. The demarcation layer will consist of geosynthetic fencing or equivalent material to be placed on the surface of residual soil/fill to provide an observable reference layer. A description or map of the approximate depth of the demarcation layer will be provided in the RCR; or (2) a land survey of the top elevation of residual soil/fill before the placement of cover soils, pavement and associated sub-soils, or other materials or structures or, (3) all materials beneath the approved cover will be considered impacted and subject to site management after the remedy is complete. Demarcation may be established by one or any combination of these three methods. As appropriate, a map showing the method of demarcation for the Site and all



associated documentation will be presented in the RCR. This demarcation will constitute the top of the site management horizon.

## **1.9 Import of Backfill Soil from Off-Site Sources**

This Section presents the requirements for imported fill materials to be used below the cover layer and within the clean soil cover layer. All imported soils will meet OER-approved backfill and cover soil quality objectives for this Site. The backfill and cover soil quality objectives are listed in the RAP.

A process will be established to evaluate sources of backfill and cover soil to be imported to the Site, and will include an examination of source location, current and historical use(s), and any applicable documentation. Material from industrial sites, spill sites, environmental remediation sites or other potentially contaminated sites will not be imported to the Site.

The following potential sources may be used pending attainment of backfill and cover soil quality objectives:

- Clean soil from construction projects at non-industrial sites in compliance with applicable laws and regulations;
- Clean soil from roadway or other transportation-related projects in compliance with applicable laws and regulations;
- Clean recycled concrete aggregate (RCA) from facilities permitted or registered by the regulations of NYS DEC.

All materials received for import to the Site will be approved by a PE/QEP and will be in compliance with provisions in this RAP. The RCR will report the source of the fill, evidence that an inspection was performed on the source, chemical sampling results, frequency of testing, and a Site map indicating the locations where backfill or soil cover was placed.

## **SOURCE SCREENING AND TESTING**

Inspection of imported fill material will include visual, olfactory and PID screening for evidence of contamination. Materials imported to the Site will be subject to inspection, as follows:

- Trucks with imported fill material will be in compliance with applicable laws and regulations and will enter the Site at designated locations;
- The PE/QEP is responsible to ensure that every truck load of imported material is inspected for evidence of contamination; and
- Fill material will be free of solid waste including pavement materials, debris, stumps, roots, and other organic matter, as well as ashes, oil, perishables or foreign matter.

Composite samples of imported material will be taken at a minimum frequency of one sample for every 500 cubic yards of material. Once it is determined that the fill material meets imported backfill or cover soil chemical requirements and is non-hazardous, and lacks petroleum contamination, the material will be loaded onto trucks for delivery to the Site.

Recycled concrete aggregate (RCA) will be imported from facilities permitted or registered by NYSDEC. Facilities will be identified in the RCR. A PE/QEP is responsible to ensure that the facility is compliant with 6NYCRR Part 360 registration and permitting requirements for the period of acquisition of RCA. RCA imported from compliant facilities will not require additional testing, unless required by NYSDEC under its terms for operation of the facility. RCA imported to the Site must be derived from recognizable and uncontaminated concrete. RCA material is not acceptable for, and will not be used as cover material.

#### **1.10 Fluids Management**

All liquids to be removed from the Site, including dewatering fluids, will be handled, transported and disposed in accordance with applicable laws and regulations. Liquids discharged into the New York City sewer system will receive prior approval by New York City Department of Environmental Protection (NYC DEP). The NYC DEP regulates discharges to the New York City sewers under Title 15, Rules of the City of New York Chapter 19. Discharge to the New York City sewer system will require an authorization and sampling data demonstrating that the groundwater meets the City's discharge criteria. The dewatering fluid will be pretreated as necessary to meet the NYC DEP discharge criteria. If discharge to the City sewer system is not appropriate, the dewatering fluids will be managed by transportation and disposal at an off-Site treatment facility.

Discharge of water generated during remedial construction to surface waters (i.e. a stream or river) is prohibited without a SPDES permit issued by New York State Department of Environmental Conservation.

### **1.11 Storm-water Pollution Prevention**

Applicable laws and regulations pertaining to storm-water pollution prevention will be addressed during the remedial program. Erosion and sediment control measures identified in this RAP (silt fences and barriers, and hay bale checks) will be installed 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 OER. All necessary repairs 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.

### **1.12 Contingency Plan**

This contingency plan is developed for the remedial construction to address the discovery of unknown structures or contaminated media during excavation. Identification of unknown contamination source areas during invasive Site work will be promptly communicated to OER's Project Manager. Petroleum spills will be reported to the NYS DEC Spill Hotline. These findings will be included in the daily report. If previously unidentified contaminant sources are found during on-Site remedial excavation or development-related excavation, sampling will be performed on contaminated source material and surrounding soils and reported to OER. Chemical analytical testing will be performed for Full List volatiles and semi-volatiles, pesticides/PCBs, and TAL metals, as appropriate.

### **1.13 Odor, Dust and Nuisance Control**

#### **ODOR CONTROL**

All necessary means 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 foams to cover exposed odorous soils. If odors develop and cannot otherwise be controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-Site disposal; and (e) use of chemical odorants in spray or misting systems.

This odor control plan is capable of controlling emissions of nuisance odors. 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. OER will be notified of all odor complaint events. Implementation of all odor controls, including halt of work, will be the responsibility of the PE/QEP's certifying the RCR.

#### **DUST CONTROL**

Dust management during invasive on-Site work will include, at a minimum:

- Use of a dedicated water spray methodology for roads, excavation areas and stockpiles.
- Use of properly anchored tarps to cover stockpiles.
- Exercise extra care during dry and high-wind periods.
- Use of gravel or recycled concrete aggregate on egress and other roadways to provide a clean and dust-free road surface.

This dust control plan is capable of controlling emissions of dust. If nuisance dust emissions are identified, work will be halted and the source of dusts will be identified and corrected. Work will not resume until all nuisance dust emissions have been abated. OER will be notified of all dust complaint events. Implementation of all dust controls, including halt of

work, will be the responsibility of the PE/QEP's responsible for certifying the Remedial Closure Report.

## **OTHER NUISANCES**

Noise control will be exercised during the remedial program. All remedial work will conform, at a minimum, to NYC noise control standards.

Rodent control will be provided, during Site clearing and grubbing, and during the remedial program, as necessary, to prevent nuisances.

### **1.14 Import of Clean Cover**

As of the date of this report, no soil is anticipated to be imported to the Site for use as clean cover. All imported soil will be uncontaminated, clean soil that meets the lesser of the appropriate NYSDEC 6 NYCRR Part 375-6.8(a) Unrestricted Use SCOs and the NYSDEC 6 NYCRR Part 375-6.8 groundwater protection SCOs.

The imported uncontaminated, clean soil cover will be from an approved source/facility and will be evaluated by the PE/QEP to ensure:

- 1) That a segregated stockpile for the desired amount of soil is properly maintained at the source and will not be comingled with any other material prior to importing and grading the clean soil material at the Site;
- 2) That the material does not include any solid waste, including construction and demolition material, as it's prohibited;
- 3) That screening for evidence of contamination by visual, olfactory and PID soil screening practices prior to testing at the source as well as upon importing to the Site for grading is completed; and
- 4) That a maximum five-part composite sample will be collected from the segregated stockpile at the source at a minimum frequency of one sample per 250 cubic yards and analyzed for the following Full List parameters:
  - VOCs by EPA Method 8260C (rev. 2006)
  - SVOCs by EPA Method 8270D (rev. 2007)
  - Pesticides by EPA Method 8081B (rev. 2000)

- PCBs by EPA Method 8082A (rev. 2000)
- TAL Metals by EPA Method 6010C (rev. 2007)

Upon receipt of the segregated stockpile analytical results collected at the source, a Clean Soil Sampling Report will be submitted to OER for review/approval prior to importing. The report will include the following:

- 1) Summary of number of samples collected and analyzed, tabulated data and comparison to the selected Site Use SCOs;
- 2) Analytical data sheets and chain of custody documentation;
- 3) Summary of soil quantity;
- 4) Photographs from the segregated stockpile at the source with sample point locations identified;
- 5) An affidavit from the source/facility on company letterhead stating that the segregated stockpile for the specific quantity has been properly maintained at the source and complies with the requirements listed above; and
- 6) A copy of source/facility NYSDEC permit;

A highly visible demarcation barrier (i.e. orange geo-synthetic material or equivalent) will be installed beneath the clean soil/fill surface cover. Upon importing and grading the OER approved clean soil cover for on top of a highly visible demarcation barrier, the following documentation will be presented in the Final Remedial Closure Report:

1. Copies of purchase invoices;
2. Truck transportation slips from the source to the Site;
3. Confirmation of specific quantity of soil of OER approved clean soil cover material imported and graded at the site on top of highly visible demarcation barrier;
4. Site plan depicting all areas where the OER approved clean soil cover has been placed; and
5. Photographs documenting the importing and grading of the OER approved clean soil cover across the site with the underlying highly visible demarcation barrier (i.e. orange geo-synthetic material or equivalent).

# APPENDIX D

## Vapor Barrier Specifications

## Florprufe™ 120

### Integrally bonded vapour protection for slabs on grade

#### Description

Florprufe™ 120 is a high performance vapour barrier with Grace's Advanced Bond Technology™ that forms a unique seal to the underside of concrete floor slabs.

Comprising a highly durable polyolefin sheet and a specially developed, non-tacky adhesive coating, Florprufe 120 seals to liquid concrete to provide integrally bonded vapour protection.

#### Advantages

- Forms a powerful integral seal to the underside of concrete slabs
- Protects valuable floor finishes such as wood, tiles, carpet and resilient flooring from damage by vapour transmission
- Direct contact with the slab complies with the latest industry recommendations
- Remains sealed to the slab even in cases of ground settlement
- Ultra low vapour permeability
- Durable, chemical resistant polyolefin sheet
- Lightweight, easy to apply, kick out rolls
- Simple lap forming with mechanical fixings or tape

#### Installation

Florprufe 120 is engineered for use below slabs on grade with moisture-impermeable or moisture-sensitive floor finishes that require the highest level of vapour protection.

Florprufe complies with the latest recommendations of ACI Committees 302 and 360, i.e. for slabs with vapour sensitive coverings, the location of the vapour barrier should always be in direct contact with the slab<sup>1</sup>.

The membrane is loose laid onto the prepared sub-base, forming overlaps that can be either mechanically secured or taped. The unique bond of

Florprufe to concrete provides continuity of vapour protection at laps. Alternatively, if a taped system is preferred, self-adhered Preprufe® Tape can be used to overband the laps.

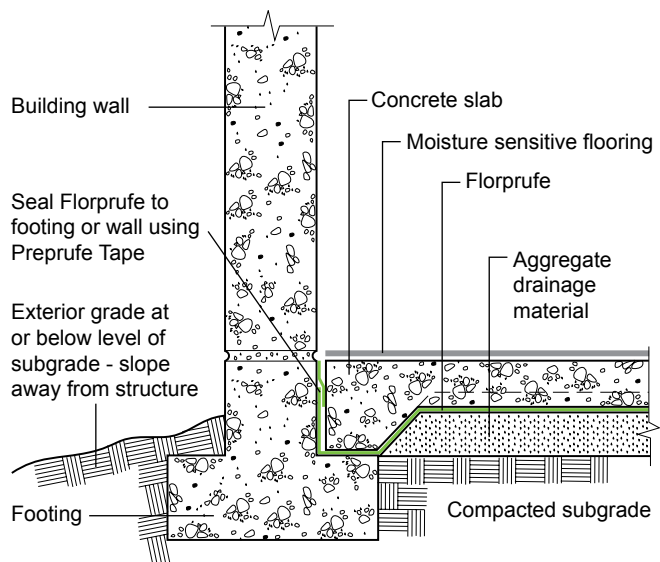
Slab reinforcement and concrete can be placed immediately. Once the concrete is poured, an integral bond develops between the concrete and membrane.

#### Health & Safety

Refer to relevant Material Safety Data Sheet. Complete rolls should be handled by 2 persons.

Florprufe 120 can be applied at temperatures of -4°C or above. Membrane installation is unaffected by wet weather. Installation and detailing of Florprufe 120 are generally in accordance with ASTM E 1643-98.

#### Typical Perimeter Detail



<sup>1</sup> ACI 302. 1R 96 Addendum



## Supply

### Florprufe 120

Supplied in rolls	1.2 m x 35 m
Roll area	42 m <sup>2</sup>
Roll weight	37 kg approx.

### Ancillary Products

Preprufe Tape is packaged in cartons containing 4 rolls that are 100 mm x 15 m.

Grace Liquid Membrane is supplied in 5.7 L pails.

### Physical Properties

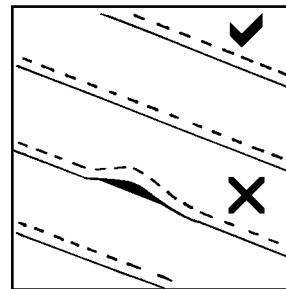
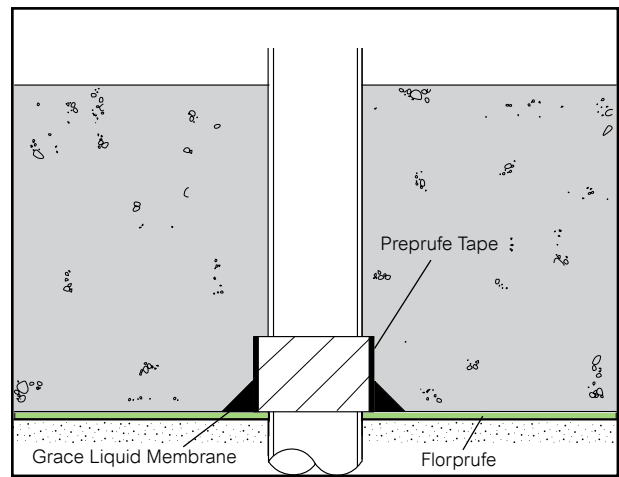
Property	Typical Values	Test Method
Colour	White	
Thicken (nominal)	0.5 mm	ASTM D 3767 Method A
Water Vapour Permeance	0.03 perms	ASTM E 96 Method B
Tensile Strength	65 lbs/in.	ASTM E 154
Elongation	300%	ASTM D 412
Puncture Resistance	3300 gms	ASTM D17091
Peel Adhesion to Concrete	>4 lbs/in.	ASTM D 903

\*Test methods that comprise ASTM E1745 standard for vapour retarders.

Prepare substrate in accordance with ACI 302.1R Section 4.1. Install Florprufe 120 over the leveled and compacted base. Place the membrane with the adhesive coated side facing towards the concrete slab. Remove and discard release liner. End laps should be staggered to avoid a build up of layers. Succeeding sheets should be accurately positioned to overlap the previous sheet 50 mm along the marked lap line.

### Laps

- Mechanical fastening method** – To prevent the membrane from moving and gaps opening, the laps should be fastened together at 1.0 m maximum centres. Fix through the centre of the lap area using 12 mm long washer-head, self-tapping, galvanized screws (or similar) and allowing the head of the screw to bed into the adhesive compound to self-seal. It is not necessary to fix the membrane to the substrate, only to itself. Ensure the membrane lays flat and no openings occur. (See Figure 1.) Additional fastening may be required at corners, details, etc. Continuity is achieved once the slab is poured and the bond to concrete develops.



OR

- Taped lap method** – For additional security use Grace Preprufe Tape to secure and seal the overlaps. Overband the lap with the 100 mm wide Preprufe Tape, using the lap line for alignment. Remove plastic release liner to ensure bond to concrete.

### Penetrations

Mix and apply Grace Liquid Membrane liquid detailing compound to seal around penetrations such as drainage pipes, etc. (See Figure 2 and refer to the Grace Liquid Membrane data sheet.)

### Concrete Placement

Place concrete within 30 days. Inspect membrane and repair any damage with patches of Preprufe Tape. Ensure all liner is removed from membrane and tape before concreting.

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

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