HEALTH AND SAFETY PLAN

Solvents Recovery Service of New England, Inc. Superfund Site Southington, Connecticut

Prepared for: de maximis, inc.

April 2010

Prepared by:



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Table of Contents

1. Eme	rgency References	5
1.1	Map and Directions from Site to Hospital	6
2. Intro	duction	1
2.1	Health and Safety Plan Applicability	1
2.2	Modifications to HASP	1
2.2.1	HASP Modifications	2
2.3	Organization/Responsibilities	2
2.3.1	TerraTherm Project Manager	2
2.3.2	TerraTherm Safety Advisor	2
2.3.3	3 TerraTherm Site Safety Officer	3
2.3.4	TerraTherm Field Personnel and Contractor Personnel	4
2.3.5	Subcontractors	4
3. Site	Description	5
3.1	Site Background	5
3.2	Site Geology/Hydrogeology	5
3.3	ISTR Target Treatment Zone	6
4. Scop	be of Work	8
4.1	Remedial Action Objectives	8
4.1.1	Human Health	8
4.1.2	Protection of the Environment	8
4.2	General ISTR Process	8
4.3	Specific Installation and Operational Tasks	9
4.3.1	Site Preparation Activities	9
4.3.2	2 ISTR System Installation	9
4.3.3	ISTD System Operation	10
4.3.4	ISTD System Monitoring	11
4.4	Other Sampling/Monitoring Requirements	11
4.4.1	Air Emissions Monitoring	11
4.4.2	2 Soil Sampling	11
4.5	Disposition of Contaminated Materials	11
4.6	System Demobilization	12
5. Cher	nical Hazards and Exposure Control	13
5.1	Chemical Hazards	13
5.1.1	Contaminants of Concern	13
5.1.2	Hazardous Substances Brought On-Site by TerraTherm or Subcontractors	24
5.2	Chemical Exposure and Control	24
5.2.1	Chemical Exposure Potential	24
5.2.2	2 Chemical Exposure Control	24



6. Phy	ysical Hazards and Controls	25
6.1	Utility Hazards	25
6.1	1.1 Underground Utilities	
6.1	.2 Overhead Utilities	
6.2	Drilling Hazards	
6.3	Noise	
6.4	Back Safety	27
6.5	Hand and Power Tool Use	27
6.5	5.1 Hand Tools	27
6.5	5.2 Knives and Cutting Tools	27
6.5	5.3 Power Tools	
6.5	5.4 Electric Tools	28
6.6	Welding Hazards	
6.7	Electrical Hazards	29
6.7	7.1 Electrical Installation	29
6.7	7.2 Working near Energized Circuits	
6.7	7.3 Lock-Out/Tag-Out	31
6.8	Machine Guarding	31
6.9	System Operation Safety	31
6.9	0.1 Exposed Hot Surfaces	31
6.9	0.2 Hot Soils/Equipment	
6.10	Thermal Stress	32
6.1	0.1 Cold Stress	
6.1	0.2 Heat Stress	
6.11	Slips, Trips, and Falls	35
7. Air	Monitoring	
7.1	Direct-Reading Instrumentation	
7.2	Calibration and Recordkeeping	
8. Per	rsonal Protective Equipment	37
8.1	Chemical Protective Clothing	37
8.2	Respiratory Protection	
8.3	Other Protective Equipment	
9. Site	e Control	
9.1	Site Identification	
9.2	Site Control	
9.2	2.1 Exclusion Zone	
9.2	2.2 Contamination Reduction Zone	
9.2	2.3 Support Zone	
9.3	Safety Practices	40



10. D	econtamination	41
10.1	Personal Decontamination	41
10.2	Equipment Decontamination	41
11. N	Iedical Monitoring and Training Requirements	42
11.1	Medical Monitoring	42
11.2	Health and Safety Training	42
11.2	2.1 HAZWOPER	42
11.2	2.2 Pre-Entry Briefing	42
11.2	2.3 Daily Safety Meetings	42
11.3	Site Visitors	42
12. E	mergency Response	43
12.1	Employee Training	43
12.2	Alarm Systems/Emergency Signals	43
12.3	Escape Routes and Procedures	43
12.4	Rescue and Medical Duty Assignments	44
12.5	Designation of Responsible Parties	44
12.6	Employee Accounting Method	44
12.7	Accident Reporting and Investigation	44
12.8	Spill Response	45

Attachment A - HASP Acknowledgement Form

- Attachment B Activity Hazard Analysis Forms
- Attachment C OSHA/EPA Occupational Chemical Database Reports and Material Safety Data Sheets for Contaminants of Concern
- Attachment D Air Monitoring Form
- Attachment E Pre-Entry Briefing Sign-Off Sheet
- Attachment F Accident Investigation Report Form



1. Emergency References

Ambulance:	911
Fire:	911
Police:	911
Medical Services:	860-276-5000
	Bradley Memorial Hospital 81 Meriden Avenue Southington, CT
State Environmental Agency:	860-424-3000
USEPA – Region 1:	888-372-7341
Poison Control:	800-222-1222
On Site Telephone:	Phone service will be available in the project trailer

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- John Bierschenk, President, Cell: 978-502-4839



1.1 Map and Directions from Site to Hospital



Driving directions to 81 Meriden Ave, Southington, CT 06489 - 2.0 mi – about 5 mins								
Start:	90 Lazy Lane, Southington, CT 06489							
1.	Head east on Lazy Lane toward CT-10/Queen Street	0.1 mi						
2.	Turn right at CT-10/Queen Street, Continue to follow CT-10	1.8 mi						
3.	Turn left at CT-120/Meriden Avenue, Destination will be on the left	0.1 mi						
End:	81 Meriden Avenue, Southington, CT 06489							



2. Introduction

2.1 Health and Safety Plan Applicability

TerraTherm, Inc. (TerraTherm) has developed this site-specific Health and Safety Plan (HASP). It establishes the health and safety procedures to minimize any potential risk to TerraTherm and TerraTherm's subcontractor personnel involved with the In Situ Thermal Remediation (ISTR) at the at the Solvents Recovery Service of New England, Inc. (SRSNE) Superfund Site in Southington, Connecticut (Site). TerraTherm is performing this work on behalf of the SRSNE Site Group.

The provisions of this plan apply to all TerraTherm personnel and TerraTherm subcontractors who may potentially be exposed to safety and/or health hazards related to activities described in Section 3.0 of this document.

This HASP has been written to comply with the requirements of the Occupational Safety and Health Administration (OSHA) Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120). All activities covered by this HASP must be conducted in complete compliance with this HASP and with all applicable federal, state, and local health and safety regulations. Personnel covered by this HASP who cannot or will not comply will be excluded from site activities.

This plan will be distributed to each employee involved with the ISTR program at the Site. Each employee must sign a copy of the attached Health and Safety Plan receipt and acknowledgment form (see Attachment A).

2.2 Modifications to HASP

The procedures in this HASP have been developed based on information provided by the SRSNE Site Group, by *de maximis, inc.*, by ARCADIS and the scope of work. Every effort has been made to address the chemical hazards that may be encountered during the implementation of the ISTR program at the Site. Similarly, this document also discusses the physical hazards associated with the ISTR program activities. However, unanticipated site-specific conditions or situations may occur during the implementation of this project. Also, TerraTherm and/or contractors may elect to perform certain tasks in a manner that is different from what was originally intended due to a change in field conditions. As such, this HASP must be considered a *working document* that is subject to change to meet the needs of this dynamic project.

Therefore, TerraTherm and/or subcontractors will review Activity Hazard Analysis (AHA) prior to the beginning of each major phase of work to ensure that all chemical and physical hazards have been properly addressed. AHAs for each major phase of work are included as Attachment B. The use of new installation techniques or operating procedures will be reviewed and if new hazards are associated with the proposed changes, they will be documented on the AHA. An effective control measure must also be identified for each new hazard. The Site Safety Officer



(SSO) will review AHAs prior to their implementation. Once approved, the AHAs will be reviewed with all field staff during the daily safety meeting.

2.2.1 HASP Modifications

Should significant information become available regarding potential on-site hazards, it may be necessary to modify this HASP. All proposed modifications to this HASP must be reviewed and approved by the Project Manager (PM) before such modifications are implemented. Any significant modifications must be incorporated into the written document as addenda and the HASP must be reissued. The PM will ensure that all personnel covered by this HASP receive copies of all issued addenda. Sign-off forms will accompany each addendum and must be signed by all personnel covered by the addendum. Sign-off forms will be submitted to the SSO. The HASP addenda should be distributed during the daily safety meeting so that they can be reviewed and discussed. Attendance forms will be collected during the meeting.

2.3 Organization/Responsibilities

The implementation of health and safety during this ISTR program will be the shared responsibility of the TerraTherm PM, the TerraTherm Construction Manager, the TerraTherm SSO, and all other on-site TerraTherm and contractor personnel.

2.3.1 TerraTherm Project Manager

The TerraTherm PM is the individual who has the primary responsibility for ensuring the overall health and safety of this project. As such, the PM is responsible for ensuring that the requirements of this HASP are implemented. Some of the PM's specific responsibilities include:

- Assigning an SSO to the project whose training and field experience is commensurate with the safety requirements of the proposed ISTR program at the Site;
- Assuring that all personnel to whom this HASP applies have received a copy of it;
- Providing the TerraTherm Construction Manager and SSO with updated information regarding environmental conditions at the Site and the scope of site work;
- Providing adequate authority and resources to the Construction Manager and SSO to allow for the successful implementation of all necessary safety procedures;
- Supporting the decisions made by the Construction Manager and/or the SSO;
- Maintaining regular communications with the Construction Manager and SSO; and,
- Coordinating the activities of all subcontractors and ensuring that they are aware of the pertinent health and safety requirements for this project.

2.3.2 TerraTherm Safety Advisor

TerraTherm's Corporate Safety & Compliance Director, Linda S. Falk, is the individual responsible for providing a safe job site and safe work practices for all employees and subcontractors at TerraTherm job sites. The Corporate Safety & Compliance Director is responsible for reviewing Incident Reports and Incident Investigations and assisting the Site Safety Officer and Project Manager, as needed.



2.3.3 TerraTherm Site Safety Officer

All TerraTherm employees working at the Site are responsible for implementing the safety requirements specified in this HASP. However, during each major phase of the project (e.g., construction, operation, demobilization), a designated employee, appointed by the PM, will serve as the SSO. During the construction phase, the SSO will be the Construction Manager. The SSO will be on-site during all activities covered by this HASP. The SSO is responsible for enforcing the requirements of this HASP once work begins. The SSO has the authority to immediately correct all situations where noncompliance with this HASP is noted and to immediately stop work in cases where an immediate danger is perceived. Some of the SSO's specific responsibilities include:

- Assuring that all personnel to whom this HASP applies have submitted a completed copy of the HASP receipt and acceptance form;
- Assuring that all personnel to whom this HASP applies attend the pre-entry briefing prior to entering an exclusion zone and also attend all subsequently scheduled safety meetings;
- Maintaining a high level of health and safety consciousness among employees at the work site;
- Reviewing the AHA for each major phase of work, in conjunction with the contractors, and identifying each new task or hazard that is not addressed by the AHA or this HASP and reviewing the information with the field team;
- Preparing new AHAs in cooperation with the Project Manager and Corporate Safety & Compliance Director as new tasks that are identified;
- Procuring and distributing the personal protective equipment (PPE), respiratory protection and safety equipment needed for this project for TerraTherm employees;
- Procuring the air monitoring instrumentation required by this HASP and performing health and safety-related air monitoring for TerraTherm activities;
- Verifying that all PPE and health and safety equipment used by TerraTherm are in good working order;
- Verifying that all subcontractors are prepared with the required PPE, respirators and safety equipment;
- Setting up and maintaining the decontamination zone and assuring proper cleanup of all site personnel involved with the ISTR program at the Site;
- Notifying the PM of all noncompliance situations and stopping work in the event that an immediate danger situation is perceived;
- Monitoring and controlling the safety performance of all personnel within the established restricted areas to ensure that required safety and health procedures are being followed;
- Conducting accident/incident investigations and preparing accident/incident investigation reports;
- Conducting the pre-entry briefing and subsequent safety meetings, as required by Section 11.0 of the HASP; and,
- Initiating emergency response procedures in accordance with Section 12.0 of this HASP.



2.3.4 TerraTherm Field Personnel and Contractor Personnel

All TerraTherm field personnel and subcontractor personnel covered by this HASP are responsible for following the health and safety procedures specified in this HASP and for performing their work in a safe and responsible manner. Some of the specific responsibilities of the field personnel are as follows:

- Reading the HASP in its entirety prior to the start of on-site work;
- Submitting a completed HASP Acceptance Form and documentation of medical surveillance and training, if applicable, to the Construction Manager or SSO prior to the start of work;
- Attending the required pre-entry briefing prior to beginning on-site work and any subsequent safety meetings that are scheduled by the SSO;
- Bringing forth any questions or concerns regarding the content of the HASP to the Construction Manager or the SSO prior to the start of work;
- Reporting all accidents, injuries and illnesses, regardless of their severity, to the SSO; and,
- Complying with the requirements of this HASP and the requests of the SSO.

2.3.5 Subcontractors

In addition to other requirements referenced in this HASP, all subcontractors are required to:

- Ensure, via daily inspections, that their equipment is in good working order;
- Operate their equipment in a safe manner;
- Appoint one employee as the SSO who will interact with the TerraTherm SSO when necessary;
- Prepare AHAs for new hazards that are introduced during the program and are not addressed in this HASP;
- Provide copies of MSDS for all hazardous materials brought on-site; and,
- Provide all the required PPE, respiratory protection and safety equipment for their employees.



3. Site Description

3.1 Site Background

The SRSNE Site is located in the Town of Southington, Connecticut, in Hartford County, approximately 15 miles southwest of the City of Hartford. It is located on Lazy Lane, just off Route 10 (Queen Street), and adjacent to the Quinnipiac River. The Site generally consists of the SRSNE Operations Area (4 acres), the Cianci Property (10 acres), a railroad right-of-way, and those areas where the SRSNE-related plume in groundwater has come to be located, including Southington's Curtiss Street Well Field (the Town Well Field Property). The Town Well Field Property is a 28-acre parcel of undeveloped land containing two municipal drinking water wells (Production Wells No. 4 and No. 6). The wells were closed in 1979 when they were found to contain volatile organic compounds (VOCs).

The SRSNE facility began operations in Southington in 1955. From approximately 1955 until the facility's closure in 1991, spent solvents were received from customers and distilled to remove impurities. Solvents and other wastes were handled and processed by several methods over the operational period, including distillation columns, lagoons, drums, and open pit incineration. Such operations were a source of historical releases of processed materials solvents and spent fuels, which resulted in the presence of Non-Aqueous Phase Liquids (NAPL) in the subsurface.

The Site was listed on the National Priorities List (NPL) in September 1983 and the USEPA initiated the Remedial Investigation (RI) for the Site in 1990. SRSNE operations ceased in 1991, and the USEPA conducted a Time-Critical Removal Action to remove contaminated soils from the railroad grade drainage ditch and to remove some chemicals stored at the property to an off-site location in 1992. In 1994, USEPA and the SRSNE Site Group entered into an Administrative Order on Consent (AOC) to, among other things, construct and operate a pump and treatment system to contain the principally contaminated overburden groundwater (the NTCRA 1 work). USEPA subsequently issued an Action Memorandum for a second NTCRA (NTCRA 2) in 1995 to hydraulically contain VOC-impacted bedrock groundwater down gradient of the NTCRA 1 system. USEPA and the SRSNE Site Group entered into a second AOC in 1996 to implement NTCRA 2 and to complete the RI and prepare a Feasibility Study (FS). NTCRA 2 started operation in 1998. The RI and Feasibility Study (FS) were completed between 1996 and 2004, and the USEPA issued the ROD in 2005. The ROD described the selected remedy for the Site, which is the basis for the RD/RA activities being undertaken.

Additional information regarding the site background is provided in the RDWP (ARCADIS, April 2009).

3.2 Site Geology/Hydrogeology

The Site is located within the Connecticut Valley Lowland section of the New England physiographic province. The Connecticut Valley Lowland occupies a regional, structural rift



basin, which is characterized by block-faulted and tilted bedrock strata. The geology of the region, in general, consists of glacially-derived unconsolidated deposits overlying the Upper Triassic New Haven Arkose bedrock (Rogers 1985). Bedrock fractures in the region dip moderately eastward, parallel to the eastward-dipping bedding (Hubert et al. 1978; Rogers 1985; BBL 1998). Steeply dipping fractures, however, have also been observed in outcrops near the Site, and in core samples and down-hole fracture-logging results obtained within the Site. While normal faults have been mapped approximately 2.5 miles west and 2.0 miles east of the Site (Rogers 1985), no bedrock faults have been reported within the Study Area (i.e., the targeted investigation area during the Remedial Investigation, including the Site and surrounding areas). The published bedrock geologic maps do not provide a sufficient basis to evaluate the presence or locations of faults, if any, beneath the thick sequence of unconsolidated materials within the Quinnipiac River Valley in the vicinity of the Site (Rogers 1997).

Additional information regarding the site geology and hydrogeologic settings are provided in the RDWP (ARCADIS, April 2009).

3.3 ISTR Target Treatment Zone

The ISTR program Target Treatment Zone (TTZ) covers an approximate area of 74,195 square feet with a target treatment depth ranging between 12 and 24 ft bgs, depending on the depth to bedrock in the wellfield. The weighted average treatment depth is 17.1 ft. Based on this, the volume of soil to be treated in the thermal remediation project is approximately 47,298 cubic yards (CY). The TTZ is shown below in Figure 2.1.

The primary Contaminants of Concern (COCs) for the ISTR program at the Site area are:

Trichloroethene Tetrachloroethene 1,1,1-Trichloroethane Ethylbenzene Toluene p/m Xylene o Xylene

The primary COCs at the Site will likely also present daughter products at lower concentrations.





Figure 2.1. Thermal Treatment Zone



4. Scope of Work

4.1 Remedial Action Objectives

4.1.1 Human Health

- 1. Reduce or stabilize the NAPL mass that would otherwise result in groundwater concentrations that pose an excess carcinogenic risk of 1 x 10^{-4} to 1 x 10^{-6} , non-carcinogenic
- 2. Hazard Index greater than 1, a cumulative risk from multiple contaminants exceeding a lifetime cancer risk of 1 x 10⁻⁵, or that exceed applicable or relevant and appropriate requirements (ARARs).

4.1.2 Protection of the Environment

- 1. Shorten the timeframe that groundwater standards are exceeded;
- 2. Shrink the size of the groundwater contaminant plume;
- 3. Reduce groundwater contaminant concentrations; and,
- 4. Prevent the migration of NAPL.

4.2 General ISTR Process

TCH, also known as ISTR, is a field-proven remediation technology licensed by TerraTherm that has been successfully used to remediate the full range of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs)¹ at over 30 sites across the U.S. and world-wide. TCH is a viable treatment technology for nearly all VOCs including the COCs present at the SRSNE Site. TCH is particularly well-suited for application in low permeability soils because heat distribution is not affected by the low hydraulic conductivity of the soil matrix. TerraTherm is currently implementing TCH at multiple similar sites, and has successfully completed many TCH projects for VOC constituents similar to those present at the SRSNE site. Combined with a good vapor and liquid extraction strategy, the confidence in reaching remedial goals is extremely high, as evidenced by the successful completion of several time-critical Brownfield development projects using TCH.²

 Thermal energy provided by vertical heater borings will heat the soil, water, and contaminants. The heating progresses by thermal conduction, as the heater wells are heated to temperatures around 1000-1500°F (500 to 800°C), creating significant temperature gradients in the formation around each heater. Thermal conductivity of soil materials varies over a very narrow range – only by a factor of 3; therefore, thermal

¹ Stegemeier, G.L., and Vinegar, H.J. 2001. "Thermal Conduction Heating for In-Situ Thermal Desorption of Soils." Ch. 4.6, pp. 1-37. In: Chang H. Oh (ed.), *Hazardous and Radioactive Waste Treatment Technologies Handbook*, CRC Press, Boca Raton, FL.

² LaChance, J., G. Heron and R. Baker. 2006. "Verification of an Improved Approach for Implementing In-Situ Thermal Desorption for the Remediation of Chlorinated Solvents." *Remediation of Chlorinated and Recalcitrant Compounds: Proceedings of the Fifth International Conference* (May 22-25, 2006). Battelle, Columbus, OH.



conduction heating (ISTD) is very precise and predictable regardless of the permeability of the soil or its degree of heterogeneity.

- 2. The heat front moves away from the heaters through the soil by thermal conduction and convection, and the superposition of heat from the many heaters results in a temperature rise throughout the TTZ.
- 3. As soil temperatures increase, contaminants and water contained in the soil matrix are vaporized. While locations close to heaters (i.e., 1 ft) may achieve temperatures well above the boiling point of water (212°F or 100°C), locations in between heaters need only achieve 212°F (100°C) to accomplish steam distillation for effective removal of VOCs. Boiling off all the soil water is not necessary. Very high (>99%) removal rates have been repeatedly measured for ISTD of VOCs.
- 4. The vacuum applied to the vapor extraction wells from the process system will draw the vapors through the soils and into the off-gas piping network for subsequent treatment.

4.3 Specific Installation and Operational Tasks

The major installation and operation field tasks associated with the ISTR program at the Site to be performed by TerraTherm and subcontractors hired directly by TerraTherm include:

- Site preparation activities
- Installation of the ISTR program at the Site system (wells, electrical, mechanical, Air Quality Control (AQC))
- ISTR system operation/monitoring
- Decommissioning and demobilization activities

4.3.1 Site Preparation Activities

Prior to the ISTR program at the Site, some ancillary tasks must be completed. These tasks include the following:

- Perform boundary survey and utility marking (performed by others)
- Establish site security (i.e. erect perimeter fencing) (performed by others)
- Mobilize temporary facilities (project trailer, storage container, port-a-john, etc.)
- Establish exclusion zones
- Construct equipment pads (gravel and/or concrete) as required
- Install utility services for the project including, electric, water, and sewer (performed by others)

4.3.2 ISTR System Installation

The TCH heater wells are laid out on a triangular grid pattern with a spacing of approximately 14 feet. In portions of the site with sufficient vadose zone thickness the VEWs are located approximately 3 ft from each heater well. In the portion of the site to the east of the railroad right-of-way, where the vadose zone is thin (i.e., <3 ft thick), permeable fill will be placed over the ground surface and horizontal VEWs will be installed. Combined temperature/pressure and groundwater level monitoring wells are distributed evenly throughout the wellfield.



The total number of wells for the ISTR program area is as follows:

- 593 heater wells (based on a spacing of 14 feet),
- 550 vertical vapor extraction wells across the unsaturated zone,
- 260 linear feet of horizontal vapor extraction wells,
- 50 boreholes for temperature monitoring, and
- 25 combined temperature/pressure and groundwater level.
- 7 Groundwater Monitoring wells

Wellfield installation activities include the following:

- Install wells and measurement points (heater wells, vacuum extraction wells, temperature and pressure measurement points)
- Install the surface cover
- Install heater elements into the wells
- Run vapor collection manifold pipe and fit up connections to the individual vapor extraction wells
- Install vapor collection and treatment equipment
- Install liquid (condensate) treatment system
- Make utility connections for water and sewer
- Install the electrical power service for the ISTR program at the Site system
- Wire ISTD heaters and process treatment equipment
- Install and wire field and process system instrumentation
- Calibrate, test and shakedown all equipment, instruments and systems; and
- Install Groundwater Monitoring wells

Vapors will be extracted from the subsurface under vacuum and pass through a moisture separator to remove entrained liquid and condensate prior to vapor treatment by dual Thermal Oxidizers (TO) and a wet scrubber.

The liquid condensate that accumulates in the wellfield piping manifold and moisture separator will be transferred to a phase separator designed to separate Light Non-Aqueous Phase Liquid (LNAPL) and DNAPL from water, if present. LNAPL and DNAPL, if present, will be collected in drums and the effluent water will be conveyed to an air stripper for treatment followed by a liquid phase carbon absorber for final polish prior to discharge to the Publically Owned Treatment Works (POTW).

4.3.3 ISTD System Operation

Once TerraTherm has completed and tested the electrical and mechanical connections, the ISTR program system will be commissioned and startup testing will begin. This includes calibrating and testing instrumentation, testing process safety interlocks, and starting and checking process vent fans, AQC and scrubber systems, and other major components of the



off-gas treatment system. Once the system commissioning and testing is successfully completed, the heaters will be energized and the ISTR program at the Site will begin.

4.3.4 ISTD System Monitoring

The ISTD system operator will collect the following measurements manually (Monday through Friday; and Saturday and Sunday, if onsite):

- Power usage (reading of totalizing meters) and circuit amperage readings.
- Cumulative liquid flows from totalizing flow-meters.
- Temperature, pressure and flow gauge readings for the treatment system.
- Wellfield temperature readings.
- Wellfield pressure readings (gauges placed in the wellfield).
- Groundwater Sampling

In addition, at least once per site visit, the site operator will perform a general inspection of the accessible ISTR program at the Site system components to identify components that may require maintenance or adjustment and to correct potential problems before they occur. In addition to these manual measurements, certain process performance monitoring data will be collected by the Programmable Logic Controller (PLC) and data acquisition system.

TerraTherm's home office will also remotely monitor the system and an automatic teledialer will call out to both the system operator and the home office in the event of any system upset such as a power failure, low vacuum/blower fault, etc.

4.4 Other Sampling/Monitoring Requirements

4.4.1 Air Emissions Monitoring

A handheld photo-ionization detector (MiniRAE 2000 or similar) will be used to screen the vapor concentrations. Ambient air samples within the ISTR program area will be collected to monitor the ambient air quality during the construction and operation of the ISTR system. Additionally, TerraTherm will obtain process vapor samples in order to monitor the efficiency of the AQC system. Process vapor samples will be collected at sample locations located in the influent to and effluent from the compression and condenser treatment unit, and the effluent from the vapor-phase Granular Activated Carbon (GAC) polishing unit.

A humidity filter is typically required for the PID. The screening data will be included in the daily data collection sheet.

4.4.2 Soil Sampling

Two interim and one confirmatory soil sampling effort will be conducted by TerraTherm staff.

4.5 Disposition of Contaminated Materials

A limited volume of contaminated materials may be generated throughout the various stages of the thermal remedy including:



- Soil cuttings during well installations and sampling;
- Spent media associated with the vapor treatment system;
- Excess condensate and water associated with personnel and equipment decontamination;
- Particulate matter that may be collected by the AQC system; and
- Construction debris and waste materials generated during demobilization from the site.
- NAPL

Soil waste material, spent media and decontamination fluids will be sampled for waste characterization to determine final disposition.

4.6 System Demobilization

Upon completion of the ISTR program at the Site, temporary facilities will be disconnected and/or removed as appropriate. Once post-treatment sampling is completed, heaters, wiring and piping will be removed from the wellfield, decontaminated as required and demobilized. The aboveground ISTD equipment will be decontaminated and demobilized. Thermal wells and measurement points will be filled with bentonite-cement grout from the bottom up to surface of the vapor cap using a tremie tube. Prior to demobilizing from the site, TerraTherm will perform rough grading as needed to maintain adequate drainage, remove berms or swales constructed for the thermal remedy, and generally return the site to a condition substantially similar to its condition prior to the start of construction.



5. Chemical Hazards and Exposure Control

5.1 Chemical Hazards

5.1.1 Contaminants of Concern

The primary contaminants of concern (COCs) identified in the subsurface at the at the Site include various metals, VOCs/NAPL, Polycyclic Aromatic Hydrocarbons (PAHs), PolyChlorinated Biphenyls (PCBs) and organic compounds, including halogenated compounds.

Overexposure to the COCs likely to be present in the Site soils may result in the symptoms listed in Table 5.1 below. Table 5.1 below also lists the OSHA Permissible Exposure Limits (PEL), the NIOSH Immediately Dangerous to Life and Health (IDLH) concentrations, and the possible exposure route for Site COCs and the treatment for exposure.

Note that Table 5.1 also identifies the COCs that are possible human carcinogens including: arsenic, benzene, beryllium, cadmium, PAHs, 1,2-dichloroethane, methylene chloride, nickel, PCBs, trichloroethene, and vinyl chloride.

Note that the IDLH concentration is a vapor phase concentration, as compared to the soil concentration that will be encountered during onsite activities. However, if high soil concentrations and/or NAPL are encountered at some locations in the ISTR program at the Site this has the potential to produce elevated concentrations in the vapor phase that could impact the breathing zone. As such, ambient air monitoring will be conducted to monitor breathing zone VOC concentrations.

Attachment C contains the full OSHA/EPA Occupational Chemical Database reports for the site COCs. Given the potential hazards associated with these chemicals, it is important that the reader familiarize himself with the key data on the OSHA/EPA and MSDS data sheets.



Table 5.1. Chemical Hazard Information

Substance	IP ¹	Odor							IDLH
[CAS Number]	(eV)	Threshold	Route ²	Symptoms of Exposure	Treatment	TWA ³	STEL⁴	Source⁵	(NIOSH) ⁶
		(ppm)							
Acetone	9.7	13-100	Inh	Irritated eyes, nose, and throat; headache;	Eye: Irrigate immediately	1000 ppm	750 ppm	PEL	20,000 ppm
[67-64-1]			Ing	dizziness; dermatitis	Skin: Soap wash immediately	500 ppm		TLV	
			Con		Breath: Respiratory support	250 ppm		REL	
					Swallow: Immediate medical attention				
Arsenic and soluble	NA	NA	Inh	Ulceration of nasal septum; dermatitis;	Eye: Irrigate immediately (15 min)	0.01 mg/m ³		PEL	Ca
inorganic			Abs	gastrointestinal disturbances;	Skin: Soap wash immediately	0.01 mg/m ³		TLV	(5 mg/m ³)
compounds (as As)			Ing	hyperpigmentation of skin (carcinogenic);	Breath: Respiratory support		C0.002	REL	
[7740-38-2]			Con	peripheral neuropathy; respiratory irritation	Swallow: Immediate medical attention	(Ca-29 CFR	mg/m ³		
						1910.1018)			
Barium soluble	ND	NA	Inh	Upper respiratory irritation; gastroenteritis;	Eye: Irrigate immediately	0.5 mg/m ³		PEL	50 mg/m ³
compounds (as Ba)			Ing	muscular spasms; slow pulse, extra	Skin: Water flush immediately	0.5 mg/m ³		TLV	
[7440-39-3]			Con	systoles; hypokalemia; eye and skin	Breath: Respiratory support	0.5 mg/m ³		REL	
				irritation; skin burns	Swallow: Immediate medical attention				
Benzene	9.24	34-119	Inh	Irritated eyes, nose, skin, and respiratory	Eye: Irrigate immediately	1 ppm		PEL	Ca
[71-43-2]			Abs	system; giddiness; headache; nausea;	Skin: Soap wash immediately	(0.5 ppm) NIC-		TLV	(500 ppm)*
			Ing	staggered gait; fatigue; anorexia, lassitude;	Breath: Respiratory support	0.1 skin	2.5 ppm	REL	
			Con	dermatitis; bone marrow depression –	Swallow: Immediate medical attention	0.1 ppm			*OSHA
				carcinogenic					29 CFR
									1910.1028
Beryllium and	NA	NA	Inh	Respiratory systems; weakness, fatigue,	Eye: Irrigate immediately	0.002 mg/m ³	C0.005	PEL	Са
compounds (as Be)			Con	weight loss – carcinogenic	Skin: Soap wash immediately	NTE 0.0005	mg/m ³	TLV	(4 mg/m ³)
[7440-41-7]					Breath: Respiratory support	mg/ m ³	(30 min	REL	
					Swallow: Immediate medical attention	0.002 mg/m ³	max)		
2-Butanol	10.1		Inh	Throat irritation, cough, and difficulty	Eye: Irrigate immediately	150 ppm		PEL	2000 ppm
[78-92-2]			Ing	breathing; headache, nausea and vomiting,	Skin: Soap wash immediately	100 ppm		TLV	
			Con	diarrhea, muscle weakness, giddiness,	Breath: Respiratory support	100 ppm,	150 ppm	REL	
				ataxia, confusion, delirium, and coma.	Swallow: Immediate medical attention				
2-Butanone (MEK)	9.54	NE	Inh	Irritated eyes, skin, nose; headache	Eye: Irrigate immediately	200 ppm		PEL	3000 ppm
[78-93-3]			Ing	dizziness; vomiting; dermatitis	Skin: Soap wash immediately	200 ppm	300 ppm	TLV	
			Con		Breath: Respiratory support	200 ppm	300 ppm	REL	

Health and Safety Plan In Situ Thermal Remediation at Solvents Recovery Service of New England April 2010 Page 15 of 92



Substance [CAS Number]	IP ¹ (eV)	Odor Threshold (ppm)	Route ²	Symptoms of Exposure	Treatment	TWA ³	STEL ⁴	Source ⁵	IDLH (NIOSH) ⁶
					Swallow: Immediate medical attention				

Health and Safety Plan In Situ Thermal Remediation at Solvents Recovery Service of New England April 2010 Page 16 of 92



Cis-1,2-	9.65	17	Inh	Irritated eyes, nausea, vomiting, and	Eye: Irrigate immediately	200 ppm		PEL	1000 ppm
Dichloroethene			Ing	epigastric distress. Symptoms of exposure-	Skin: Soap wash promptly	200 ppm		TLV	
156-59-2			Con	related narcosis including drowsiness,	Breath: Respiratory support	200 ppm		REL	
				tremor, incoordination, dizziness, and	Swallow: Immediate medical attention				
				weakness; defatting of skin/dermatitis					
Cadmium dust (as	NA	NA	Inh	Pulmonary edema, dyspnea, cough, chest	Eye: Irrigate immediately	0.005 mg/m ³		PEL	Са
Cd)			Ing	tightness, substernal pain; headache; chills,	Skin: Soap wash immediately	0.01 mg/m ³		TLV	(9 mg/m ³)
[7440-43-9]			_	muscular aches; nausea, vomiting, diarrhea;	Breath: Respiratory support	Ca, lowest		REL	
				anosmia, emphysema, proteinuria, mild	Swallow: Immediate medical attention	feasible			
				anemia – carcinogenic		concentration			
Carbon	11.47	NA	Inh	Irritation to eyes, skin; CNS depression;	Eye: Irrigate immediately	10 ppm;	2 ppm, 60	PEL	200 ppm
Tetrachloride			Abs	nausea, vomiting, drowsiness, dizziness,	Skin: Soap wash immediately	Ceiling:	minutes	TLV	
56-23-5			Ing	incoordination; liver and kidney injury	Breath: Respiratory support	25ppm, 200		REL	
			Con		Swallow: Immediate medical attention	ppm, 5-minute			
						maximum peak			
						in any 4 hours			
						5 ppm			
						2 ppm, 60			
						minutes			
Chloroethane			Inh	Highly discomforting to the upper respiratory	Eye: Irrigate immediately	1000 ppm		PEL	3800 ppm
[75-00-3]			Abs	tract and lungs and may be harmful if	Skin: Soap wash immediately	100 ppm; skin		TLV	(10% LEL).
				inhaled. Depression of the central nervous	Breath: Respiratory support			REL	
				system Ingestion may result in nausea,	Swallow: Immediate medical attention				
				abdominal irritation, pain and vomiting					
Chromium metal (as	NA	NA	Inh	Histologic fibrosis of lungs	Eye: Irrigate immediately	1 mg/m ³		PEL	250 mg/m ³
Cr)			Ing		Skin: Soap wash immediately	0.5 mg/m ³		TLV	
[7440-47-3]					Breath: Respiratory support	0.5 mg/m ³		REL	
					Swallow: Immediate medical attention				



Coal-tar-pitch	ND	ND	Ing	Eye sensitivity to light; eye and skin	Eye: Irrigate immediately	0.2 mg/m ³		PEL	Ca
volatiles			Con	irritation, dermatitis, bronchitis; carcinogenic	Skin: Soap wash immediately	0.2 mg/m ³		TLV	[80 mg/m ³]
(benzene-soluble					Breath: Respiratory support	0.1 mg/m ³		REL	
fraction)					Swallow: Immediate medical attention				
(polynuclear									
aromatic									
hydrocarbons [PAH])									
[65996-93-2]									
Copper dusts and	NA	NA	Inh	Irritated pharynx and nasal mucous	Eye: Irrigate immediately	1 mg/m ³		PEL	100 mg/m ⁴
mists (metal)			Ing	membrane; nasal perforation; eye irritation;	Skin: Soap wash immediately	1 mg/m ³		TLV	
(copper sulfate)			Con	metallic taste; dermatitis; in animals: lung,	Breath: Respiratory support	1 mg/m^3		REL	
[7440-50-8]				kidney, and liver damage; anemia	Swallow: Immediate medical attention	C C			
1,2-Dichloroethane	11.05	ND	Inh	Depressed cns, nausea, vomiting,	Eye: Irrigate immediately	50 ppm	2 ppm	PEL	Ca
(ethylene dichloride)			Abs	dermatitis, irritated eyes, corneal opacity.	Skin: Soap wash promptly	w/ceiling		TLV	(50 ppm)
(107-06-02			Ing	Carcinogenic	Breath: Respiratory support	100ppm	2 ppm	REL	
,			Con	, , , , , , , , , , , , , , , , , , ,	Swallow: Immediate medical attention	10 ppm			
						1 ppm			
1 2 Dichloroethylene	9.65		Inh	Irritated eves respiratory system: CNS	Eve: Irrigate immediately	200 ppm		PFI	1000 ppm
(DCF)	0.00		Ing	depression	Skin: Soap wash immediately	200 ppm		TLV	rooo ppin
540-59-0			Con		Breath: Respiratory support	200 ppm		REI	
040 00 0			0011		Swallow: Immediate medical attention	200 ppm		INCE -	
1 1-Dichloroethane	11.06		Inh	Irritated skin: CNS depression liver kidney	Eve: Irrigate immediately	100 ppm	300 ppm	PEI	
r, i Dichiorocanarie	11.00		Ing	lung damage	Skin: Soan wash immediately	ioo ppin	000 ppm		
[75-35-3]			Con		Breath: Respiratory support	100 ppm		PEI	
[75-55-5]			COII		Swallow: Immediate medical attention	ioo ppin			
1.1 Disblarathana			lah	Irritation to avon alkin and reanizatory tract		100 ppm		DEI	2000 ppm
			 ng	dizzinana anushing staggaring disturbed	Eye. Ingale Inmediately	100 ppm			SUUU ppm
75-34-3			ing	dizziness, cougning, staggering, disturbed	Skin: Soap wasn immediately	100 ppm			
			Con	vision, irregular neartbeat, unconsciousness	Breath: Wove to tresh air, respiratory	100 ppm		REL	
					support				
					Swallow: Medical support, do not				
			1		induce vomiting				

Health and Safety Plan In Situ Thermal Remediation at Solvents Recovery Service of New England April 2010 Page 18 of 92



1,1-Dichloroethene	8.20	ND	Ing	Irritated eyes, skin, throat; dizziness,	Eye: Irrigate immediately			PEL	
(vinylidene chloride)			Inh	headache, nausea; dyspnea; liver, kidney	Skin: Soap wash immediately	5 ppm		TLV	
[75-35-4]			Con	dysfunction, pneuitis; carcinogen	Breath: Respiratory support			REL	
			Abs		Swallow: Immediate medical attention				
Ethylbenzene	8.76	0.09-0.6	Inh	Irritated eyes, mucous membranes;	Eye: Irrigate immediately	100 ppm	125 ppm	PEL	800 ppm
[100-41-4]			Ing	headache; dermatitis; narcosis, coma	Skin: Water flush immediately	100 ppm	125 ppm	TLV	
			Con		Breath: Respiratory support	100 ppm	125 ppm	REL	
					Swallow: Immediate medical attention				
Ethanol			Inh	Discomforting to the upper respiratory tract;	Eye: Irrigate immediately		1000 ppm	PEL	3300 ppm
[64-17-5]			Con	vapor is discomforting to the eyes; liquid is	Skin: Water flush immediately		1000 ppm	TLV	(10% LEL)
			Ing	mildly discomforting to the skin and may	Breath: Respiratory support			REL	
				cause drying of the skin, which may lead to	Swallow: Immediate medical attention				
				dermatitis					
Iron oxide, dust and	NA	NA	Inh	Non-progressive dust-caused lung disease,	Breath: Respiratory support	10 mg/m ³ *		PEL	2500
fumes (as Fe)				with x-ray shadows indistinguishable from		5 mg/m ³		TLV	mg/m ³
[1309-37-1]				progressive fibrous lung disease		5 mg/m ³ *		REL	
						*total			
						particulate			
Lead, inorganic	NA	NA	Inh	Weakness, lassitude, insomnia; facial pallor;	Eye: Irrigate immediately	0.05 mg/m ³		PEL	100 mg/m ³
dusts and fumes (as			Ing	eye pallor; anorexia, low weight,	Skin: Soap wash immediately	0.05 mg/m ³		TLV	
Pb)			Con	malnutrition; constipation, abdominal pain,	Breath: Respiratory support	<0.1 mg/m ³		REL	
[7439-92-1]				colic; anemia; gingival lead line; tremors;	Swallow: Immediate medical attention				
				wrist and ankle paralysis; brain damage;		See 29 CFR			
				kidney damage; irritated eyes; hypotension		1910.1025			
Manganese, dust	NA	NA	Inh	Parkinson's; asthenia, insomnia, mental	Breath: Respiratory support		C5 mg/m ³	PEL	500 mg/m ³
and compounds (as			Ing	confusion; metal fume fever; dry throat,	Swallow: Immediate medical attention	0.2 mg/m ³		TLV	
Mn)				cough, tight chest, dyspnea, rales, flu-like		1 mg/m ³	3 mg/m ³	REL	
[7439-96-5]				fever; low back pain; vomiting; malaise;					
				fatigue					
Magnesium metal	ND	ND	Inh	Irritated upper respiratory tract, eyes, and	Eye: Irrigate immediately	NE		PEL	
[7439-95-4]			Abs	skin; coughing, conjunctivitis; small blisters;	Skin: Water flush immediately			TLV	
			Ing	nausea, vomiting, hypotension	Breath: Respiratory support			REL	
			Con		Swallow: Immediate medical attention				

Health and Safety Plan In Situ Thermal Remediation at Solvents Recovery Service of New England April 2010 Page 19 of 92



Methyl alcohol	10.84	2000 ppm	Inh	Irritated eyes, skin, upper respiratory syst;	Eye: Irrigate immediately	200 ppm	250 ppm	PEL	6000 ppm
(Methanol)			Abs	head drowsiness, dizziness, vertigo,	Skin: Water flush promptly	200 ppm		TLV	
67-56-1			Ing	nausea, vomiting; blindness	Breath: Respiratory support	200 ppm		REL	
			Con		Swallow: Immediate medical attention				
4-Methyl-2-	9.3		Inh	Irritated eyes, skin, mucous membrane,	Eye: Irrigate immediately	100 ppm			500 ppm
Pentanone			Ing	headache, narcosis, coma; dermatitis; in	Skin: Water flush immediately	50 ppm			
(Methyl isobutyl			Con	animals: liver kidney damage	Breath: Respiratory support	50 ppm			
ketone, hexanone)					Swallow: Immediate medical attention				
[108-10-1]									
Mercury vapor	ND	ND	Inh	Coughing, chest pain, dyspnea, bronchial	Eye: Irrigate immediately	0.05 mg/m ³	C0.1 ppm	PEL	2 mg/m ³
[7439-97-6]			Abs	pneumonitis; tremors, insomnia; irritability,	Skin: Soap wash immediately	0.025 mg/m ³		TLV	
			Con	indecision; headache; fatigue, weakness,	Breath: Respiratory support	0.05 mg/m ³	C0.1 ppm	REL	
				stomatitis, salivation; gastrointestinal	Swallow: Immediate medical attention	(skin)			
				disturbance, anorexia, low weight;					
				proteinuria; irritated eyes and skin					
Methylene chloride	11.32	ND	Inh	Fatigue, weakness, sleepiness,	Eye: Irrigate immediately	25 ppm	C1,000 ppm	PEL	Ca
(dichloromethane)			Ing	lightheadedness; numbness and tingling in	Skin: Soap wash immediately	50 ppm	C2,000	TLV	(2300 ppm)
[75-09-2]			Con	limbs; nausea; irritated eyes and skin	Breath: Respiratory support		mg/m ³	REL	
					Swallow: Immediate medical attention		(5 min in 2		
							hrs)		
Naphthalene	8.12	ND	Inh	Irritated eyes; headache; confusion,	Eye: Irrigate immediately	10 ppm		PEL	250 ppm
[91-203]			Abs	excitement, malaise; nausea, vomiting,	Skin: Molten flush immediately/	10 ppm	15 ppm	TLV	
			Ing	abdominal pain; irritated bladder, profuse	sol-liq soap wash promptly	10 ppm		REL	
			Con	sweating; jaundice, renal shutdown;	Breath: Respiratory support				
				dermatitis	Swallow: Immediate medical attention				
Nickel, metal, and	NA	NA	Inh	Headache, vertigo; nausea, vomiting,	Eye: Irrigate immediately	1 mg/m^3		PEL	Ca
other compounds			Ing	epigastric pain; substernal pain; coughing,	Skin: Water flush immediately	1.5 mg/m ³ *		TLV	10 mg/m ³
(as Ni)			Con	hyperpnea; cyanosis; weakness;	Breath: Respiratory support	0.015 mg/m ³		REL	
[7440-02-0]				leukocytosis, pneumonitis; delirium,	Swallow: Immediate medical attention	Ca			
				convulsions – carcinogenic					
						*NIC-0.05 A1			
Phenol	8.5	0.040-3.0	Inh	Irritated eyes, nose, and throat; anorexia,	Eye: Irrigate immediately	5 ppm (skin)		PEL	250 ppm
[108-95-2]			Abs	low weight; weakness, muscular aches and	Skin: Soap wash immediately	5 ppm (skin)		TLV	
			Ing	pains; dark urine; cyanosis; liver and kidney	Breath: Respiratory support	5 ppm (skin)	C15.6 ppm	REL	
			Con	damage; skin burns; dermatitis; ochronosis;	Swallow: Immediate medical attention				
				tremors, convulsions, twitching					



Polychlorinated	ND	ND	Inh	Aroclar 1242: irritated eves: chlorache:	Eve: Irrigate immediately	Araclar 12/2			
Folychionnaleu	ND	ND	11111 A h e	Alociol 1242. Initiated eyes, chiolache,	Clein: Coop week immediately	A100101 1242.		DEI	0.0
Dipnenyis (PCB)			ADS	ache-form dermatitis, mildly toxic by	Skin: Soap wasn immediately	1 mg/m (Skin)		PEL	
			Ing	ingestion; poison by subcutaneous route –	Breath: Respiratory support	1 mg/m ⁻ (skin)		I LV	(10 mg/m^2)
Aroclor 1242			Con	carcinogenic	Swallow: Immediate medical attention	0.001 mg/m ³		REL	
[53469-21-9] and									
Aroclor 1254				Aroclor 1254: irritated eyes and skin; acne-		Aroclor 1254:			
[11097-69-1]				form dermatitis; poison by intravenous route;		0.5 mg/m ³		PEL	Ca
				moderately toxic by ingestion and		(skin)		TLV	(5 mg/m ³)
				intraperitoneal routes – carcinogenic		0.5 mg/m^3		REL	
						(skin)			
						0.001 mg/m^3			
2-Propanol			Inh	irritating to the respiratory tract and can	Eve: Irrigate immediately	400 ppm		PFI	2000 ppm
[67-63-0]			Abe	cause central nervous system depression:	Skin: Soan wash immediately	200 ppm	400 ppm		(10% EL)
[07-03-0]			AUS	cause central hervous system depression,	Breath, Despiratory support	200 ppm	400 ppm		(10% LEL).
			ing	flucture discrete la contraction de la contraction	Breath. Respiratory support	400 ppm		RELS	
			Con	flushing, dizziness, lowered blood pressure,	Swallow: Immediate medical attention				
				mental depression, hallucinations and					
				distorted perceptions, difficulty breathing,					
				respiratory depression, stupor,					
				unconsciousness, and coma. Kidney					
				insufficiency including oliguria (reduced					
				urine excretion), anuria (absent urine					
				excretion), nitrogen retention, and edema					
				(fluid build-up in tissues) may occur.					
Silver (metal)	NA	NA	Inh	Blue-gray eyes, nasal septum, throat, and	Eye: Irrigate immediately	0.01 mg/m ³		PEL	10 mg/m ³
[7440-22-4]			Ing	skin; irritated skin, ulceration;	Skin: Water flush immediately	0.1 mg/m^3		TLV	U U
			Con	gastrointestinal disturbance	Breath: Respiratory support	0.01 mg/m^3		REL	
				g	Swallow Immediate medical attention				
Styrene	8 40	ND	Inh	Irritated eves nose and respiratory system:	Eve: Irrigate immediately	100 ppm		PFI	700 ppm
[100-42-5]	0.40		Δhs	headache: fatique dizziness confusion	Skin: Water flush immediately	20 ppm	100 ppm	TLV	700 ppm
[100-42-0]			Ing	malaise drowsiness unsteady asit	Breath: Respiratory support	50 ppm	ioo ppiii	PEI	
			Con	naraosia: defetting dermetitia: reproductive	Swellow: Immediate mediael attention	50 ppm		NEL	
			Con	narcosis, delating dermatitis; reproductive	Swallow. Inimediate medical attention				
				effects					

Health and Safety Plan In Situ Thermal Remediation at Solvents Recovery Service of New England April 2010 Page 21 of 92



				1					
Tetrahydrofuran			Ing	Moderately discomforting to the upper		200 ppm		PEL	2000 ppm
[109-99-9]			Con	respiratory tract.		200 ppm	250ppm	TLV	(10% LEL).
				Inhalation of vapor may aggravate a pre-		200 ppm	250ppm	REL	
				existing respiratory condition.	Eye: Irrigate immediately				
				Overexposure by inhalation may result in the	Skin: Soap wash immediately				
				irritation of the mucous membrane and	Breath: Respiratory support				
				cause coughing, chest pains, nausea,	Swallow: Immediate medical attention				
				dizziness, headache and narcosis. Exposure					
				to high concentrations can affect the central					
				nervous system skin contact may cause					
				reactions which may lead to dermatitis.					
				Certain grades of tetrahydrofuran may					
				cause liver and kidney damage.					
Tetrachloroethylene	9.32	ND	Inh	Irritation to eyes, skin, nose, throat, and	Eye: Irrigate immediately	100 ppm	C 200 ppm,	PEL	150 ppm
(perchloroethylene)			Abs	respiratory system; nausea; flush face, neck;	Skin: Soap wash immediately	25 ppm	300 ppm (5-	TLV	
[127-18-4]			Ing	vertigo, dizziness, incoordination; headache,	Breath: Respiratory support		min	REL	
			Con	somnolence; skin erythema; liver damage;	Swallow: Immediate medical attention		maximum		
				carcinogen			peak in any		
							three hours)		
Thallium	ND	ND	Inh	Irritated eyes and skin; nausea, vomiting,	Eye: Irrigate immediately	0.1 mg/m ³		PEL	15 mg/m ³
[7440-28-0]			Abs	diarrhea; headache; chest pain or tightness;	Skin: Soap wash immediately	0.1 mg/m ³		TLV	
			Ing	excessive salivation	Breath: Respiratory support	0.1 mg/m ³		REL	
			Con		Swallow: Immediate medical attention	-			
Trichloroethylene	9.45	21.4	Inh	Headache, vertigo; visual disturbance,	Eye: Irrigate immediately	100 ppm	C200 ppm	PEL	Ca
(TCE,			Ing	tremors, somnolence, nausea, vomiting;	Skin: Soap wash immediately	50 ppm	C100 ppm	TLV	(1,000
trichloroethene)			Con	irritated eyes; dermatitis; cardiac arrhythmia,	Breath: Respiratory support	25 ppm (10-	C2 ppm	REL	ppm)
[79-01-6]				paresthesia – carcinogenic	Swallow: Immediate medical attention	hour)	(60 MIN)		
1,1,1-	11.0		Inh	Irritated eyes, skin; headache, lassitude,	Eye: Irrigate immediately	350 ppm	450 ppm	PEL	700ppm
Trichloroethane			Ing	CNS depression, poor equilibrium,	Skin: Soap wash immediately	350 ppm		TLV	
(methyl chloroform)			Con	dermatitis, cardiac arrhythmia; liver damage	Breath: Respiratory support		C 350 ppm	REL	
					Swallow: Immediate medical attention				
[71-55-6]									

Health and Safety Plan In Situ Thermal Remediation at Solvents Recovery Service of New England April 2010 Page 22 of 92



Vanadium pentoxide			Inh	Irritated eyes, skin, throat; green tongue,	Eye:	Irrigate immediately			PEL	35 mg/m ³
(as dust)			Ing	metallic taste; eczema; cough; fine rales,	Skin:	Soap wash immediately	0.5 ppm	C0.5 mg/m ³	TLV	
[1314-62-1]			Con	wheezing, bronchitis dyspnea (breathing	Breath:	Respiratory support		(respirable)	REL	
				difficulty)	Swallov	w: Immediate medical attention				
Vinyl chloride	9.99	25	Inh	Intoxication, weakness; abdominal pain; GI	Eye:	Irrigate immediately	1 ppm	5 ppm	PEL	Ca
[75-01-4]			Con	bleeding; enlarged liver; pallor; cyanosis of	Skin:	Soap wash immediately	1 ppm		TLV	
				extremities	Breath:	Respiratory support			REL	
					Swallov	w: Immediate medical attention				
Xylene (o-, m-, and	8.56	1.1-20	Inh	Dizziness, excitement, drowsiness,	Eye:	Irrigate immediately	100 ppm	150 ppm	PEL	900 ppm
p-isomers)	8.56		Abs	incoordination, staggering gait; irritated	Skin:	Soap wash immediately	100 ppm	150 ppm	TLV	
[1330-20-7; 95-47-6;	8.44		Ing	eyes, nose, throat; corneal vacuolization;	Breath:	Respiratory support	100 ppm	150 ppm	REL	
108-38-3; 106-42-3]			Con	anorexia, nausea, vomiting, abdominal pain; dermatitis	Swallov	w: Immediate medical attention				
Zinc (as oxide fume)	NA	NA	Inh	Sweet metallic taste; dry throat, cough,	Breath:	Respiratory support	5 mg/m ³	10 mg/m ³	PEL	50 mg/m ³
[1314-13-2]				chills, fever; tight chest, dyspnea, rales,			5 mg/m°		ILV	
				reduced pulmonary function; headache;			5 mg/m°		REL	
				blurred vision; muscular cramps, low back						
				pain; nausea, vomiting; fatigue, lassitude,						
				malaise						

¹IP = Ionization potential (electron volts).

²Route = Inh, Inhalation; Abs, Skin absorption; Ing, Ingestion; and Con, Skin and/or eye contact.

³TWA = Time-weighted average. The TWA concentration for a normal workday (usually 8 or 10 hours) and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day without adverse effect.

⁴STEL = Short-term exposure limit. A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the TWA is not exceeded.

⁵PEL = Occupational Safety and Health Administration (OSHA) permissible exposure limit (29 CFR 1910.1000, Table Z).

⁵TLV = American Conference of Governmental Industrial Hygiene (ACGIH) threshold limit value – TWA.

⁵REL = National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit.

⁶IDLH (NIOSH) = Immediately dangerous to life or health (NIOSH). Represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.

NE = None established. No evidence could be found for the existence of an IDLH (NIOSH Pocket Guide to Chemical Hazards, Pub. No. 90-117, 1990, 1997).

C = Ceiling limit value which should not be exceeded at any time.

Ca = Carcinogen.

NA = Not applicable.

ND = Not Determined.

Health and Safety Plan In Situ Thermal Remediation at Solvents Recovery Service of New England April 2010 Page 23 of 92



- LEL = Lower explosive limits.
- LC_{50} = Lethal concentration for 50 percent of population tested.
- LD_{50} = Lethal dose for 50 percent of population tested.
- NIC = Notice of intended change (ACGIH).

References:

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Workplace Environmental Exposure Levels, American Industrial Hygiene Association, 1992.



5.1.2 Hazardous Substances Brought On-Site by TerraTherm or Subcontractors

A material safety data sheet (MSDS) must be available for each hazardous substance that TerraTherm or their subcontractors bring on the site. This includes solutions/chemicals that will be used to decontaminate sampling equipment, calibration gases, or fuels.

In addition, all containers of hazardous materials, including tanks, vessels and other containers, must be labeled in compliance with OSHA's Hazard Communication Standard with either the original manufacturer's label or an NFPA 704M label specific for the material (as shown at right).



5.2 Chemical Exposure and Control

5.2.1 Chemical Exposure Potential

Site soils are known to be impacted with various metals, VOCs/NAPL, polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs) and organic compounds, including halogenated compounds. Although efforts will be made during drilling to minimize soil cuttings, impacted subsurface soils may be brought to the surface during well installation activities. Therefore, the field team should be prepared for the potential for exposure to the contaminants of concern, via inhalation of dusts and vapors and direct dermal contact.

5.2.2 Chemical Exposure Control

TerraTherm will use several methods to control the potential for chemical exposure during the proposed ISTR program at the Site:

- The breathing zone of employees will be screened for the presence of chlorinated VOC vapors using a PID during subsurface activities that disturb contaminated soils as well as during the sampling of the off-gas system. Where applicable, focused screening will be performed for known carcinogenic compounds via short-term detector tubes (i.e., Draeger or other) or time-weighted average exposure monitoring. Engineering controls will be used to minimize vapor or airborne hazards to the extent possible. If sustained vapor concentrations exceed the established action level, as defined in Section 7.1, respiratory protection, as indicated in Section 8.2, will be donned.
- The ISTD wells will be installed using sonic drilling technology; therefore, dust generation is
 expected to be minimized. If a significant amount of visible dust is generated, the SSO may
 opt to utilize a portable dust monitor during well installation/excavation activities to determine if
 sustained dust levels exceed the established action level. Engineering controls (e.g., applying
 light mist of water; modifying drilling methods) will be used if the action limit is exceeded.
- To avoid direct dermal contact with contaminated soils, protective clothing, as described in Section 8.1, will be required, as specified for each task.
- Although highly unlikely, exposure to the contaminants of concern may occur via ingestion (hand-to-mouth transfer). The decontamination procedures described in Section 10.0 address personal hygiene issues that will limit the potential for contaminant ingestion.



6. Physical Hazards and Controls

6.1 Utility Hazards

6.1.1 Underground Utilities

It is expected that all subsurface utilities within the immediate vicinity of the ISTR program at the Site will have been relocated prior to TerraTherm's mobilization to the Site. Regardless, the driller and excavating contractors must exercise due diligence and try to identify the location of any private utilities on the property being investigated. The contractors can fulfill this requirement in several ways, including:

- Obtaining as-built drawings for the areas being investigated from the property owner;
- Visually reviewing each proposed drilling/excavation location with the property owner or knowledgeable site representative;
- Hiring a private line locating firm to determine the location of utility lines that are present at the property or, if necessary, performing a geophysical survey to locate utilities;
- Identifying a no-drill zone; or,
- Hand digging or vacuum excavation in the proposed drilling locations if insufficient data is available to accurately determine the location of the utility lines.

6.1.2 Overhead Utilities

Any vehicle or mechanical equipment capable of having parts of its structure elevated (i.e., drill rig, manlift, telehandler, crane) near energized overhead lines shall be operated so that a clearance of at least 10 feet is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over that voltage.

The danger posed by overhead power lines at the site will be compounded during use of cranes by other factors, such as uneven ground that could cause the crane to weave or bob into power lines, and windy conditions that can make the power lines sway, reducing clearance. To address these risks, the following procedures shall be followed:

* Overhead power lines and safe routes will be marked where cranes must repeatedly travel.

* The crane will be operated at a slower-than-normal speed in the vicinity of power lines.

* When working around overhead power lines, the lines will be de-energize, grounded, guarded, and/or insulated, if feasible.

* If the power lines are not de-energized, cranes will only be operated if a safe minimum clearance is maintained.

* If maintaining safe clearance by visual means is difficult, the SSO to observe the clearance and to give immediate warning when the crane approaches the limits of safe clearance.

* All persons shall keep well away from the crane whenever it is close to power lines.

* The crane or its load shall not be contacted until a signal person indicates that it is safe to do so.

6.2 Drilling Hazards

Sonic drilling technology will be used to install the wells and measurement points for the ISTR program at the Site. Use of a drill rig to install thermal wells will require all personnel in the



vicinity of the operating rig to wear steel-toed boots, hardhats, hearing protection and safety eyewear. Personnel shall not remain in the vicinity of operating equipment unless it is required for their work responsibilities. Additionally, the following safety requirements must be adhered to:

- All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and technicians must be aware of the location of this device. This device must be tested prior to job initiation and periodically thereafter. The driller/operator and helper shall not simultaneously handle augers while the rig is operating unless there is a standby person to activate the emergency stop.
- The driller/operator must never leave the controls while the tools are rotating/driving unless all personnel are kept clear of rotating equipment.
- A long-handled shovel or equivalent must be used to clear drill cuttings away from the hole and from rotating/driving tools. Hands and/or feet are not to be used for this purpose.
- A remote sampling device must be used to sample drill cuttings if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating equipment. If personnel must work near any tools that could rotate, the driller/operator must shut down the rig prior to initiating such work.
- Drillers, helpers, and technicians must secure all loose clothing, or other items that could become entangled in the machinery when in the vicinity of drilling/driving operations.
- Only equipment that has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers/casing segments shall not be allowed.
- No person shall climb the drill mast while tools are rotating/operating.
- No person shall climb the drill mast without the use of ANSI-approved fall protection (approved belts, lanyards, and a fall protection slide rail) or portable ladder that meets the requirements of OSHA standards.

6.3 Noise

Use of heavy equipment during thermal well installation may expose the field team to noise levels that exceed the OSHA PEL of 90 dBA for an 8-hour day. Exposure to noise can result in the following:

- Temporary hearing losses where normal hearing returns after a rest period;
- Interference with speech communication and the perception of auditory signals;
- Interference with the performance of complicated tasks; and,
- Permanent hearing loss due to repeated exposure resulting in nerve destruction in the hearing organ.

Since personal noise monitoring will not be conducted during the proposed activities, employees must follow this general rule of thumb: If the noise levels are such that you must shout at someone 5 feet away from you, you need to be wearing hearing protection. Employees can wear either disposable earplugs or earmuffs but all hearing protection must have a minimum noise reduction rating (NRR) of 27 db.



6.4 Back Safety

Using the proper techniques to lift and move heavy and awkward pieces of equipment is important to reduce the potential for back injury. The following precautions should be implemented when lifting or moving heavy objects:

- Use mechanical devices to move objects that are too heavy to be moved manually.
- If mechanical devices are not available, ask another person to assist you.
- Bend at the knees, not the waist. Let your legs do the lifting.
- Do not twist while lifting.
- Bring the load as close to you as possible before lifting.
- Bring a card table into the field so that work can be performed at waist level versus bending over from the ground surface.
- Be sure the path you are taking while carrying a heavy object is free of obstructions and slip, trip, and fall hazards.

6.5 Hand and Power Tool Use

A variety of hand and power tools may be used during the pre-construction, system installation and demobilization activities, as well as during routine system operations and maintenance tasks. The use of each can pose serious safety hazards to the user.

6.5.1 Hand Tools

The greatest hazards posed by hand tools result from misuse and improper maintenance.

- When using hand tools be sure you have selected the right tool for the job. If a chisel is used as a screwdriver, the tip of the chisel may break or fly off, hitting the user or others.
- Inspect tools for damage such as mushroomed chisel heads or broken hammer handles. If jaws of a wrench are sprung, the wrench may slip. If a wooden handle is loose, splintered or cracked, the head of the tool may fly off.
- Do not use damaged tools.
- Be sure you know how to use the tool you are working with.

6.5.2 Knives and Cutting Tools

There is the potential for employees to cut themselves on the sharp edges of piping, unfinished or jagged edges of metal, or during the use of hand tools, as well as knives, handsaws, and blades that may be used to cut materials that are needed to install the proposed system. To prevent the potential for cuts and lacerations, employees will wear either leather work gloves or Kevlar[™] gloves. When using knives or blades for these activities, as well as others that involve the cutting of tubing and/or small diameter piping, follow the safety precautions listed below:

- Keep your free hand out of the way.
- Secure your work if cutting through thick material.
- Use only sharp blades; dull blades require more force that results in less knife control.
- Don't put your knife in your pocket.
- Use a self-retracting blade.
- Wear leather or KevlarTM gloves when using knives or blades.



6.5.3 Power Tools

To prevent hazards associated with the use of power tools, workers should observe the following general precautions:

- Never carry a tool by the cord or hose.
- Never yank the cord or the hose to disconnect it from the receptacle.
- Keep cords away from heat, oil, and sharp edges.
- Disconnect tools when not using them, before servicing or cleaning them, and when changing accessories such as blades, bits, and cutters.
- Secure work with clamps or vise, freeing up both hands to operate the tool.
- Avoid accidental starting. Do not hold fingers on the switch button when carrying a pluggedin tool.
- Keep tools sharp and clean for best performance.
- Wear appropriate clothing. Loose clothing or jewelry can become caught in moving parts.
- Keep all guards in place.

6.5.4 Electric Tools

When using portable tools that are electrically powered, follow the safety precautions listed below:

- Check to see that electrical outlets used to supply power during field operations is of the three wire grounding type.
- All portable or temporary wiring, which is used outdoors or in other potentially wet or damp locations must be connected to a circuit that is protected by a ground fault circuit interrupter (GFCI). GFCI's are available as permanently installed outlets, as plug-in adapters and as extension cord outlet boxes. DO NOT CONTINUE TO USE A PIECE OF EQUIPMENT OR EXTENSION CORD THAT CAUSES A GFCI TO TRIP.
- Extension cords used for field operations should be of the three wire grounding type and designed for hard or extra-hard usage. This type of cord uses insulated wires within an inner insulated sleeve and will be marked S, ST, STO, SJ, SJO, or SJTO.
- NEVER remove the ground plug blade to accommodate ungrounded outlets.
- Do not use extension cords as a substitute for fixed or permanent wiring. Do not run extension cords through openings in walls, ceilings, or floors.
- Protect the cord from becoming damaged if the cord is run through doorways, windows, or across pinch points.
- Examine extension and equipment cords and plugs prior to each use. Damaged cords with frayed insulation or exposed wiring and damaged plugs with missing ground blades MUST BE REMOVED from service immediately.
- When working in flammable atmospheres, be sure that the electrical equipment being used is approved for use in Class I, Division I atmospheres.

6.6 Welding Hazards

Welding is considered "Hot Work" and shall comply with TerraTherm's Hot Work Program and site-specific hot work requirements. Field welding may be required where it is not possible to install full length cans/liners (e.g., where overhead electrical hazards or other obstructions are



present, where the drill rig cannot handle long pipes) and/or for equipment/material/fixture fabrication or repair. The specific welding process being used is shielded metal arc welding or "stick welding" or "MIG" metal inert gas welding for most work on carbon steel components. In addition, field welding may be required to fabricate or repair stainless steel heater liners and/or heater elements. The "TIG" (Tungsten Inert Gas) welding method will be used for this work. An inert gas, commonly nitrogen, is expelled from the tip of the Tungsten electrode to "shield" the weld pool.

The electrode and work circuit is electrically live whenever the output is on. The input power circuit and machine internal circuits are also live when the power is on. To avoid electrical shocks and burns, do not touch live electrical parts. Employees will wear dry, hole-free insulating gloves. Insulate yourself from work and ground using dry insulating mats. Always verify the supply ground. When making input connections, attach proper grounding conductor first. Inspect power cord for damage or bare wiring. Replace immediately if damaged. Connect work cable to the work as close as possible to the welding area as practical to prevent welding current from traveling long, possibly unknown paths and causing electric shock and fire hazards.

Electric arc welding is a source of intense radiation of visible light and invisible (infrared and ultraviolet) rays that can burn eyes and skin. UV light is the most harmful fraction of the radiant energy produced. If unprotected, intense irritation of the cornea and eyelids occurs. The action of UV light on the exposed skin of the welder produces a burn similar to sunburn. It is therefore mandatory for the welder to wear a welding helmet fitted with the proper shade of filter. Based on the type of welding and the various electrode sizes being used, filters with shade # 10, #12 and #14 will be required. Warn others not to watch the arc and if necessary, use a protective screen or barrier to protect others from flash and glare.

Welding produces gases (i.e. ozone, nitric oxide and nitrogen dioxide) and metal fumes. However, welding is being conducted outdoors so natural dilution ventilation should be sufficient to remove gases and fumes from welder's breathing zone.

Sparks and molten metal can fly off from the welding arc. The flying sparks, as well as the hot work piece and hot equipment, can cause fires. Accidental contact of the electrode to metal objects can cause sparks, explosion, overheating or fire. Do not weld where sparks can strike flammable materials. Remove all flammables and combustibles within 35 ft of the welding arc. Keep a fire extinguisher in the welding area. Wear oil-free protective garments. Welders should also wear leather gloves and boots and flame-resistant coveralls that are cuff-less. When refueling, stop the engine and let it cool off.

As welds cool, they can throw off slag. Wear safety glasses with side shields under welding helmet.

6.7 Electrical Hazards

6.7.1 Electrical Installation

Electrical work on this project will be performed in accordance with the National Electrical Code (NEC, NFPA 70). A licensed electrician, subcontracted to TerraTherm, will perform electrical wiring. *de maximis* is responsible for bringing electrical service to the ISTR program area.



TerraTherm's subcontracted electrician will wire the electrical distribution panels, connect power wiring to the off-gas treatment equipment, and wire the ISTD heaters. TerraTherm staff will support the well field wiring efforts and will install low voltage instrumentation wiring (e.g., thermocouple extension cable).

There will be no exposed, live electrical parts in the wellfield. Electrical connections to the primary and secondary sides of the transformers and the various power distribution panels will be made within approved electrical enclosures using standard UL approved electrical connection devices. ISTD heater electrical connections will be made inside NEMA 3R or NEMA 4 electrical enclosures. To protect against worker injury in the event of an electrical fault with the heater elements, the heater cans, well screens, and metallic process piping will be bonded together with an appropriately sized copper conductor, which will be connected to an earth ground (i.e., ground rod). In addition, metallic instrumentation ports (e.g., temperature and pressure measurement points) will also be bonded to an earth ground. Transformers and electrical distribution gear will be connected to an earth ground as required by the NEC.

The silicon controlled rectifiers (SCRs) used to supply power to the heater circuits are encased in a fiberglass enclosure on the front and sides, however the top and bottom are typically open frame structures to allow flow through and/or forced ventilation to dissipate the heat generated by these devices. As such, the SCRs will be enclosed in a locked shed, accessible to authorized personnel only. Authorized and trained personnel shall only enter the SCR shed when necessary to perform maintenance on the devices, and shall use appropriate PPE for the task being performed. At a minimum, leather boots, safety glasses and voltage rated gloves must be worn when working in this enclosure. Additional PPE including arc-flash protective hood and shield, and fire resistant coveralls are also required when testing or working on live equipment in this enclosure. Lock-out/tag-out procedures shall also be followed when removing, replacing or repairing SCRs.

To minimize the potential for worker exposure to energized electrical sources, access to the electrical distribution panels and the heater element electrical junction boxes will be restricted to authorized personnel only. Electrical components will be equipped with appropriate warning labels (e.g., high voltage, arc flash) as required by the NEC.

6.7.2 Working near Energized Circuits

Per OSHA electrical regulations (29 CFR 1910.333), only "qualified" persons may work on energized electrical circuit parts or equipment or perform testing work on energized electrical circuits or equipment. TerraTherm has provided electrical safety and arc flash safety training to our field staff and have designated selected staff members as "qualified" for the purpose of performing maintenance and troubleshooting on electrical equipment and circuits.

The OSHA standard further states that even qualified persons working near exposed energized electrical parts can't approach closer than 1 foot of a system that is over 300 volts but not over 750V. The standard does allow for closer approaches by qualified personnel if personnel are wearing insulated gloves with the proper voltage rating. For this program, qualified personnel will wear rubber insulated gloves with a voltage rating of up to 1,000 volts (Class O glove). Leather protector gloves will be worn over the rubber insulating gloves.


6.7.3 Lock-Out/Tag-Out

It is the responsibility of TerraTherm employees (and/or subcontractors) to verify that all equipment is locked out in accordance with TerraTherm's standard operating procedures before performing any maintenance or repair work on energized equipment. The source must be locked out; it is not enough to push the power switch to "off" and disconnect the breaker. Anyone can reengage power under these circumstances. Locking out the power source is the only way to guarantee that the power will not be inadvertently reactivated.

The ISTR program at the Site Operation and Maintenance Manual will include a lock-out/tag-out procedure for use during troubleshooting and maintenance activities. TerraTherm and electrical subcontractor personnel will be instructed in the application of these lock-out/tag-out procedures during the site-specific training and will be required to follow the procedures during electrical repair and/or maintenance activities.

6.8 Machine Guarding

Certain components of the off-gas treatment system may be guarded. Machine guards are designed to protect hands and arms from being cut, amputated or crushed. Machine areas that are typically guarded include:

- Points of operation;
- Mechanical power transmission apparatus; and,
- Moving points or pinch points (any point other than a point of operation at which it is possible for a part of the body to be caught).

Most machine guards are built into the equipment. The machine guards that are most common for this project include the metal mesh covers that are placed around the drive belts of the pumps, blowers, or compressors and the blade guards on cutting and grinding tools. These guards can be removed to perform repairs or maintenance to the equipment. However, in compliance with 29 CFR 1910.211-222, equipment shall not be operated without having the required machine guards in place. As such, all employees are reminded to replace all machine guards if they have to be removed to facilitate maintenance activities.

6.9 System Operation Safety

The ISTD treatment system components have inherent fail-safes to protect from overheating, fire, and catastrophic failure, as well as accidental discharge of hazardous materials during system malfunction. Examples of such safety features include:

- Heater elements are self-regulating with respect to power consumption to prevent elements from overheating and burning out or failing;
- A pressure sensor installed in the well field manifold piping will monitor the vacuum level in the manifold. This sensor will provide input to the motor controller for the main process blower, modifying the blower speed to maintain the system vacuum at the desired setpoint.

6.9.1 Exposed Hot Surfaces

Appropriate measures will be taken to protect on-site workers from incidental contact with exposed hot surfaces. Exposed hot surfaces may include the heater cans, process piping and



certain components of the off-gas treatment equipment. Surfaces that are expected to exceed 140°F will be covered with insulation or otherwise protected with a guard where insulation is not practical. In addition, personnel working in areas where incidental contact with hot surfaces (140°F) may be possible will wear leather gloves.

In some instances, exposure to hot material and/or components is unavoidable. Such circumstances may include, but are not limited to, replacing ISTD heater elements (if required) during heating and dismantling the ISTR program at the Site system. In these instances, only trained personnel will be allowed in the work area. Worker protective measures will be selected in accordance with the potential heat exposure. For example, if removal and replacement of a heater element is required during the heating, the heater element may be in excess of 500°F. In this case, TerraTherm personnel will wear special high-temperature heat resistant gloves. Direct contact with the hot heater element will be minimized to the extent possible (e.g., using a hook or chain to remove and/or move the hot heater element). TerraTherm will also include specific procedures for handling these potential exposures to high temperatures as part of the Operation and Maintenance Plan.

6.9.2 Hot Soils/Equipment

A minimum soil temperature of approximately 100°C (212°F) is expected to be achieved over the vertical soil profile at the centroids after a period of full power heating. Soil temperatures closer to the heater wells are expected to be in excess of 400°C (800°F) by that time. If necessary, hot core barrels may be handled with tongs and/or high temperature gloves until aircooled sufficiently to handle with gloves. Hot well screens/cans may be directly handled during demobilization and may require the wearing of high-temperature gloves.

6.10 Thermal Stress

6.10.1 Cold Stress

Types of Cold Stress

Cold injury is classified as either localized, as in frostbite, frostnip, or chilblain; or generalized, as in hypothermia. The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness, and inadequate clothing.

The likelihood of developing frostbite occurs when the face or extremities are exposed to a cold wind in addition to cold temperatures. The freezing point of the skin is about 30°F. The fluids around the cells of the body tissue freeze, causing the skin to turn white. This freezing is due to exposure to extremely low temperatures. As wind velocity increases, heat loss is greater and frostbite will occur more rapidly.

Symptoms of Cold Stress

The first symptom of frostbite is usually an uncomfortable sensation of coldness, followed by numbness. There may be a tingling, stinging, or aching feeling in the affected area. The most vulnerable parts of the body are the nose, cheeks, ears, fingers, and toes.



Symptoms of hypothermia, a condition of abnormally low body temperature, include uncontrollable shivering and sensations of cold. The heartbeat slows and may become irregular, the pulse weakens and the blood pressure changes. Pain in the extremities and severe shivering can be the first warning of dangerous exposure to cold.

Maximum severe shivering develops when the body temperature has fallen to 95°F. This must be taken as a sign of danger and exposure to cold must be immediately terminated. Productive physical and mental work is limited when severe shivering occurs.

Methods to Prevent Cold Stress

When the ambient temperature, or a wind chill equivalent, falls to below 40°F (American Conference of Governmental Industrial Hygienists recommendation), site personnel who must remain outdoors should wear insulated coveralls, insulated boot liners, hard hat helmet liners and insulated hand protection. Wool mittens are more efficient insulators than gloves. Keeping the head covered is very important, since 40% of body heat can be lost when the head is exposed. If it is not necessary to wear a hard hat, a wool knit cap provides the best head protection. A facemask may also be worn.

Persons should dress in several layers rather than one single heavy outer garment. The outer piece of clothing should ideally be wind and waterproof. Clothing made of thin cotton fabric or synthetic fabrics such as polypropylene is ideal since it helps to evaporate sweat. Polypropylene is best at wicking away moisture while still retaining its insulating properties. Loose fitting clothing also aids in sweat evaporation. Denim is not a good protective fabric. It is loosely woven which allows moisture to penetrate. Socks with high wool content are best. If two pairs of socks are worn, the inner sock should be smaller and made of cotton, polypropylene, or a similar type of synthetic material that wicks away moisture. If clothing becomes wet, it should be taken off immediately and a dry set of clothing put on.

If wind conditions become severe, it may become necessary to shield the work area temporarily. The SSO and the PM will determine if this type of action is necessary. The project trailer is heated and should be available for periodic warming if work is performed continuously in the cold at temperatures, or equivalent to wind chill temperatures, of 20°F.

Dehydration occurs in the cold environment and may increase the susceptibility of the worker to cold injury due to significant change in blood flow to the extremities. Drink plenty of fluids, but limit the intake of caffeine.

6.10.2 Heat Stress

Types of Heat Stress

Heat related problems include heat rash, fainting, heat cramps, heat exhaustion, and heat stroke. Heat rash can occur when sweat isn't allowed to evaporate, leaving the skin wet most of the time and making it subject to irritation. Fainting may occur when blood pools to lower parts of the body and as a result, does not return to the heart to be pumped to the brain. Heat related fainting often occurs during activities that require standing erect and immobile in the heat for long periods of time. Heat cramps are painful spasms of the muscles due to excessive salt loss associated with



profuse sweating. Heat exhaustion results from the loss of large amounts of fluid and excessive loss of salt from profuse sweating. The skin will be clammy and moist and the affected individual may exhibit giddiness, nausea, and headache. Heat stroke occurs when the body's temperature regulatory system has failed. The skin is hot, dry, red, and spotted. The affected person may be mentally confused and delirious. Convulsions could occur. **EARLY RECOGNITION AND TREATMENT OF HEAT STROKE ARE THE ONLY MEANS OF PREVENTING BRAIN DAMAGE OR DEATH.** A person exhibiting signs of heat stroke should be removed from the work area to a shaded area. The person should be soaked with water to promote evaporation. Fan the person's body to increase cooling. Increased body temperature and physical discomfort also promote irritability and a decreased attention to the performance of hazardous tasks.

Early Symptoms of Heat-Related Health Problems:

- Decline in task performance •
- Lack of coordination
- Decline in alertness
- Unsteady walk

Susceptibility to Heat Stress Increases due to:

- Lack of physical fitness
- Lack of acclimation
- Increased age
- Dehydration

- Excessive fatigue
- Reduced vigilance
- Muscle cramps
- Dizziness
- Obesity
 - Drug or alcohol use
- Sunburn
- Infection

People unaccustomed to heat are particularly susceptible to heat fatigue. First timers in PPE need to gradually adjust to the heat.

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The Effect of Personal Protective Equipment

Sweating normally cools the body as moisture is removed from the skin by evaporation. However, the wearing of certain personal protective equipment (PPE), particularly chemical protective coveralls (e.g., Tyvek), reduces the body's ability to evaporate sweat and thereby regulate heat buildup. The body's efforts to maintain an acceptable temperature can therefore become significantly impaired by the wearing of PPE.

Measures to Avoid Heat Stress:

The following guidelines should be adhered to when working in hot environments:

- Establish work-rest cycles (short and frequent are more beneficial than long and seldom).
- Identify a shaded, cool rest area.
- Rotate personnel, alternative job functions.
- Water intake should be equal to the sweat produced. Most workers exposed to hot conditions drink less fluid than needed because of an insufficient thirst. DO NOT



DEPEND ON THIRST TO SIGNAL WHEN AND HOW MUCH TO DRINK. For an 8-hour workday, 50 ounces of fluids should be drunk.

- Eat lightly salted foods or drink salted drinks such as Gatorade to replace lost salt.
- Save most strenuous tasks for non-peak heat hours such as the early morning or at night.
- Avoid double shifts and/or overtime.

The implementation and enforcement of the above mentioned measures will be the joint responsibility of the project manager and the SSO. Potable water should be made available each day for the field team.

Heat Stress Monitoring Techniques

Site personnel should regularly monitor their heart rate as an indicator of heat strain by the following method: Check radial pulse rates by using fore-and middle fingers and applying light pressure to the pulse in the wrist for one minute at the beginning of each rest cycle. If the pulse rate exceeds 110 beats/minute, shorten the next work cycle by one-third and keep the rest period the same. If, after the next rest period, the pulse rate still exceeds 110 beats/minute, shorten the work cycle again by one-third.

6.11 Slips, Trips, and Falls

Maintaining a work environment that is free from accumulated debris is the key to preventing slip, trip, and fall hazards at construction sites. Essential elements of good housekeeping include:

- Orderly placement of materials, tools and equipment;
- Placing trash receptacles at appropriate locations for the disposal of miscellaneous rubbish;
- Prompt removal and secure storage of items that are not needed to perform the immediate task at hand; and
- Awareness on the part of all employees to walk around, not over or on, equipment that may have been stored in the work area.

During the winter months, snow shovels and salt crystals should be kept on site to keep paths and work areas free of accumulated snow and ice.



7. Air Monitoring

7.1 Direct-Reading Instrumentation

A Photo-Ionization Detector (PID), such as a MiniRAE, equipped with an 11.7eV lamp, will be used to screen the breathing zone of employees during ISTD wellfield installation and system influent and effluent monitoring. A project-specific action limit is calculated based on the OSHA PEL of 1 ppm for vinyl chloride using the vendor's reported response correction factor to the selected compound with an 11.7eV lamp (0.64) divided by an applied safety factor of 2. For VC, this level calculates to 0.3 PID. Given this range and the mix of compounds that are likely to be present, a reading of 1.0 unit above background has been selected as the action level for this project.

If breathing zone concentrations are sustained (for 15 minutes) at **1 unit above background** and administrative or engineering controls are not sufficient to eliminate the vapor concentrations, **Level C respiratory protection**, as described in Section 8.2, will be donned.

If breathing zone concentrations exceed **30 units**, **work will be temporarily suspended** until the PM and Safety Advisor can determine the best control measures to implement to control VOC concentrations.

All sampling will be conducted by the SSO. Readings will be taken at regular intervals (i.e., at least once every hour) from the breathing zone of employees during subsurface activities, or more frequently when noticeable odors are present. Additional monitoring may be required if action levels are repeatedly exceeded during a certain activity.

7.2 Calibration and Recordkeeping

The PID will be calibrated to a 100 ppm isobutylene-in-air standard on a daily basis in accordance with manufacturer's instructions. All PID readings will be recorded in the field notebook or on dedicated air monitoring result sheets (see Attachment D). In addition, all calibrations must be recorded.



8. Personal Protective Equipment

Personal Protective Equipment (PPE) will be worn to prevent on-site personnel from being injured by the safety hazards posed by the site and/or the activities being performed. In addition, chemical protective clothing will be worn to prevent direct dermal contact with impacted soils during certain intrusive activities. The following table describes the PPE and chemical protective clothing to be worn, where required, for general site activities and for certain specific tasks.

8.1 Chemical Protective Clothing

PPE Item	Task #						
	1	2	3	4	5	6	7
Hard Hat	~	~	~	~	~	~	~
Long Sleeve Shirt	~			~	~	~	~
Rubber steel-toed boots or booties		~					For Wet Decon
Steel Toed Safety boots	~	~	\checkmark	~	~	~	~
Safety Glasses with Side shields	~	~	\checkmark	~	~	~	~
Tyvek coveralls	As Needed	~	As Needed	As Needed	~	~	For Wet Decon
Inner Nitrile gloves	As Needed	~	As Needed	~	~	~	~
Outer Nitrile rubber gloves		As Needed	As Needed	As Needed	~	~	~
Leather or Kevlar gloves	~	~	~	1	When cutting open liners	When cutting open liners	~
Heat Resistant gloves				Contact w/ hot surfaces	As needed	~	As needed
Hearing Protection	As Needed	~	As Needed	As Needed	As Needed	~	As Needed

Task 1 – Site Preparation

Task 2 – Installation of Wells/Wellfield

Task 3 – Mechanical/Electrical Construction Activities

Task 4 – Operating/Monitoring System

Task 5 – Carbon Media Change Out

Task 6 – Interim/Confirmatory Soil Sampling

Task 7 – Demobilization



8.2 Respiratory Protection

Respiratory protection may be needed during activities that involve disturbance to impacted soils and influent and effluent monitoring. If total VOC concentrations exceed the breathing zone action level as stipulated in Section 7.1 (sustained for 15-minutes), Level C respiratory protection will be donned. Respirators may also be donned if odors are a nuisance. Combination acid gas and organic vapor cartridges are the preferred cartridge for this application.

Level C Specification- Air-purifying respirator organic vapor cartridge

If breathing zone concentrations exceed the work stoppage level as stipulated in Section 7.1, work will be temporarily suspended until the PM and Safety Advisor can determine the best control measures to implement to control VOC concentrations.

All employees who are expected to wear respiratory protection must have successfully passed a quantitative or qualitative fit-test within the past year.

8.3 Other Protective Equipment

The following additional safety items should be available in the immediate work area and the project trailer:

- Portable, hand-held eyewash
- First aid kit
- Type A-B-C fire extinguisher (on drill rig, in project trailer, and near welding operations)
- Lock-out/Tag-out Kit



9. Site Control

9.1 Site Identification

A site contact poster will be displayed in a permanent and conspicuous location at the Site. The poster will identify a TerraTherm contact name and contact phone number.

9.2 Site Control

To prevent both exposure of unprotected personnel and migration of contamination due to tracking by personnel or equipment, work areas along with personal protective equipment requirements will be clearly identified. TerraTherm designates work areas or zones as suggested in the "Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities," NIOSH/OSHA/USCG/EPA, November, 1985. They recommend the areas surrounding each of the work areas to be divided into three zones:

- Exclusion or "Hot" Zone
- Contamination Reduction Zone (CRZ)
- Support Zone

9.2.1 Exclusion Zone

It is assumed that the fence that ARCADIS will install around the site will provide a sufficient degree of access control for the site. In addition to this, TerraTherm will erect a secondary interior temporary fence to segregate the ISTR program at the Site. This secondary fence will also demarcate the exclusion zone. This zone will serve to protect site visitors and delivery personnel from chemical or physical hazards that are associated with the implementation of the ISTD remediation program. All personnel entering the exclusion zone must wear the prescribed level of protective equipment for the specific task and meet the training requirements of Section 10.

9.2.2 Contamination Reduction Zone

Decontamination zones will be established adjacent to the exclusion zone. Personnel will remove contaminated gloves and other disposable items in these areas and place them in a 55-gallon drum or other container until they can be properly disposed. To assist with the decontamination of rubber boots that have been in direct contact with contaminated materials, a boot wash and boot storage area will be established in each CRZ. A bench will be placed in this area to assist employees when removing their boots.

9.2.3 Support Zone

A project trailer will be mobilized to the Site and will serve as the support zone for the ISTR program.



9.3 Safety Practices

The following measures are designed to augment the specific health and safety guidelines provided in this plan.

- TerraTherm employees will implement the "buddy system" during construction and demobilization and for heavy lifting activities and when entering the energized wellfield. The buddy system does not need to be implemented when TerraTherm employees are performing routine recording of system parameters. However, the employees must have the ability to contact additional TerraTherm staff or the site's representative if assistance is needed for certain tasks.
- Eating, drinking, chewing gum or tobacco, smoking or any practice that increases the probability of hand-to-mouth transfer and ingestion of materials is prohibited in the exclusion zone and the decontamination zone.
- Smoking is prohibited in all contaminated work areas. Matches and lighters are not allowed in these areas.
- Hands and face must be thoroughly washed upon leaving the work area and before eating, drinking, or any other activities.
- Beards or other facial hair that interfere with respirator fit are prohibited.
- The use of alcohol or illicit drugs or being under the influence of such is prohibited during the conduct of field operations.
- All equipment must be decontaminated or properly discarded before leaving the Site.



10. Decontamination

10.1 Personal Decontamination

Proper decontamination is required of all personnel before leaving the site. Decontamination will occur within the contamination reduction zone (CRZ). Disposable PPE will be removed in the decontamination zone and placed in 55-gallon drums. To assist with the decontamination of rubber boots that have been in direct contact with tarry materials, a three-basin boot wash and boot storage area will be established in the CRZ.

If worn, respirators will be cleaned after each use with respirator wipe pads and will be stored in plastic bags after cleaning. At the end of the day, respirators will be washed with warm, soapy water, and then rinsed in clear cool water. If possible, respirators should be allowed to air-dry in a clean area. If such an area does not exist, respirators will be wiped dry and placed in plastic bags for proper storage.

Regardless of the type of decontamination system required, a container of potable water and liquid soap should be made available in the immediate work area, so employees can wash their hands and face before leaving the site. Toilet facilities will be available next to the project trailer.

10.2 Equipment Decontamination

Large pieces of machinery will be decontaminated via dry brushing, pressure washing and/or steam cleaning. The equipment cannot leave the site until the SSO has released it.



11. Medical Monitoring and Training Requirements

11.1 Medical Monitoring

All personnel, performing activities covered by this HASP that may result in exposure to the site contaminants, must be active participants in a medical monitoring program that complies with 29 CFR 1910.120(f). Each individual must have completed an annual surveillance examination and/or an initial baseline examination within the last year prior to performing any work on the site covered by this HASP.

11.2 Health and Safety Training

11.2.1 HAZWOPER

All personnel, performing activities covered by this HASP that may result in exposure to the site contaminants, must have completed the appropriate training requirements specified in 29 CFR 1910.120(e). Each individual must have completed an annual 8-hour refresher-training course and/or an initial 40-hour training course within the last year prior to performing any work on the sites covered by this HASP.

11.2.2 Pre-Entry Briefing

The SSO will conduct a pre-entry briefing before site activities begin. HASP receipt and acceptance sheets will be collected at this meeting. Short safety refresher meetings will be conducted, as needed, throughout the duration of the project. Attendance of the pre-entry meeting and subsequent safety meetings is mandatory and will be documented by the TerraTherm SSO. An attendance form is presented in Attachment E.

11.2.3 Daily Safety Meetings

Daily safety meetings will also be conducted by the SSO to ensure that all workers are prepared for and knowledgeable of the safety hazards associated with the scheduled work. All field employees must be present during the daily safety meetings and must sign the attendance sheet for each such meeting.

11.3 Site Visitors

Only authorized personnel or authorized representatives from federal and/or state regulatory agencies will be permitted to access an exclusion zone. Visitors will not be permitted to enter the exclusion zone unless escorted by a TerraTherm employee. Visitors will not be permitted in an exclusion zone unless they have documentation that indicates they have been properly trained as described above. Additionally, visitors cannot enter the site unless they have the proper PPE, have read the HASP, signed the HASP acknowledgment form, and have attended a pre-entry briefing conducted by the TerraTherm SSO.



12. Emergency Response

OSHA defines emergency response as any "response effort by employees from outside the immediate release area or by other designated responders (i.e., mutual-aid groups, local fire departments) to an occurrence which results, or is likely to result in an uncontrolled release of a hazardous substance." TerraTherm response actions will be limited to evacuation and medical/first aid as described within this section below as well as small spill response and responding to fires that can be extinguished via the use of portable fire extinguishers.

The basic elements of an emergency evacuation plan include:

- Employee training;
- Alarm systems;
- Escape routes;
- Escape procedures;
- Critical operations or equipment;
- Rescue and medical duty assignments;
- Designation of responsible parties;
- Emergency reporting procedures; and,
- Methods to account for all employees after evacuation.

12.1 Employee Training

Employees must be instructed in the site-specific aspects of emergency evacuation. On-site refresher or update training is required anytime escape routes or procedures are modified or personnel assignments are changed. Specific escape routes from the work area will be reviewed upon arrival to the site.

12.2 Alarm Systems/Emergency Signals

An emergency communication system must be in effect at all sites. The most simple and effective emergency communication system in many situations will be direct verbal communications. Each site must be assessed at the time of initial site activity and periodically as the work progresses. Verbal communications must be supplemented anytime voices cannot be clearly perceived above ambient noise levels (i.e., noise from heavy equipment; drilling rigs, backhoes, etc.) and anytime a clear line-of-sight cannot be easily maintained amongst all TerraTherm and subcontracted personnel because of distance, terrain, or other obstructions.

Verbal communications will be adequate to warn employees of hazards associated with the immediate work area. Phone service will be available in the project trailer if local emergency responders need to be called to the site.

12.3 Escape Routes and Procedures

The escape route from the Site will be via the site entrance/exit gate onto Lazy Lane.



12.4 Rescue and Medical Duty Assignments

The phone numbers of the police and fire departments, ambulance service, local hospital, environmental regulators, poison control center, TerraTherm representatives, and facility medical/emergency response team (if applicable) are provided in the emergency reference sheet. This sheet will be posted in the site vehicles and the on-site project trailer.

In the event an injury or illness requires more than first aid treatment, the SSO, or his designated representative, will accompany the injured person to the medical facility and will remain with the person until release or admittance is determined. The escort will relay all appropriate medical information to the PM.

If the injured employee can be moved from the accident area, he or she will be brought to the CRZ where their PPE will be removed. If the person is suffering from a back or neck injury the person will not be moved and the requirements for decontamination do not apply. The SSO must familiarize the responding emergency personnel about the nature of the site and the injury. If the responder feels that the PPE can be cut away from the injured person's body, this will be done on-site. If this is not feasible, decontamination will be performed after the injured person has been stabilized.

12.5 Designation of Responsible Parties

The SSO is responsible for initiating emergency response. In the event the SSO cannot fulfill this duty, the alternate SSO will take charge.

12.6 Employee Accounting Method

All TerraTherm subcontractors and visitors must sign in and out daily on the sign-in sheet that will be located in the project trailer. This sheet will be used to count personnel in the event of an evacuation/emergency. All personnel on site are responsible for knowing the escape route from the site and where to assemble after evacuation for a headcount.

12.7 Accident Reporting and Investigation

Any incident (other than minor first aid treatment) resulting in injury and illness requires an accident investigation and report in accordance with TerraTherm's Workplace Injury and Illness Prevention Policy. The investigation should be conducted as soon as emergency conditions are under control. The purpose of the investigation is not to attribute blame but to determine the pertinent facts so that repeat or similar occurrences can be avoided. An accident investigation form is presented in Attachment F of this HASP. The injured TerraTherm employee's supervisor should be notified immediately of the injury.

If a subcontractor employee is injured, they are required to notify the TerraTherm SSO. Once the incident is under control, the subcontractor shall submit a copy of their company's accident investigation report to the SSO for review.



12.8 Spill Response

All waste materials will be managed and handled in accordance with the project work plan requirements and applicable regulations. Solid materials will be contained in roll-off containers or drums. Roll-off containers and drums will be segregated from work areas to minimize damage to the container so as to prevent a spill. Given this, TerraTherm does not anticipate the need for significant spill response during ISTR program at the Site. However, TerraTherm will be prepared for primary spill response actions in the unlikely event of a spill. The field team will be equipped with spill response kits and will be prepared to create earthen berms, when necessary, to control the spread of any spilled materials. TerraTherm will notify the appropriate facility personnel in the event of a spill requiring a response.



Attachment A

Health and Safety Plan Receipt and Acceptance Form



Health and Safety Plan Receipt and Acknowledgement Form

ISTR Program Solvents Recovery Service of New England

I have received a copy of the Health and Safety Plan prepared for the above-referenced site and activities. I have read and understood its contents and I agree that I will abide by its requirements.

Name (Print):

Signature:

Date: _____

Representing (Print):

Company Name



Attachment B

Activity Hazard Analysis Forms

Overall Risk Assessment Code (RAC) (Use highest code)

М

Activity: TCH System Operation & Sampling

Activity Location: Thermal Treatment Zone

Prepared By: Robin Swift

Date: 1 April 2010

	E = Extremely High Risk H = High Risk	Probability				
	M = Moderate Risk L = Low Risk	Frequent	Likely	Occasional	Seldom	Unlikely
s	Catastrophic	E	E	Н	Н	М
v	Critical	E	Н	Н	М	L
rit	Marginal	Н	М	М	L	L
у	Negligible	М	L	L	L	L

Risk Assessment Code Matrix

Add Identified Haza	ards
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Project: SRSNE Superfund Site

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
x	TCH System Operation	Temperature Extremes	 Employees shall be trained in the recognition of heat stress symptoms and appropriate precautions to take. Heat stress controls will be implemented per the Health and Safety Plan. The SSO will monitor personnel for signs of heat stress. Personnel will maintain fluid levels to avoid dehydration. 	L
x		Noise Hazards	 Noise levels that exceed the OSHA PEL of 90 dBA for an 8-hour day require hearing protection. Employees must follow this general rule of thumb: If the noise levels are such that you must shout at someone 5 feet away from you, you need to be wearing hearing protection. Employees can wear either disposable earplugs or earmuffs but all hearing protection must have a minimum noise reduction rating (NRR) of 27 db. 	L
х		Severe Weather	 When weather interferes with safety, all work will stop until conditions are safe. Work will stop and personnel will seek shelter during lightning storms. 	L
x		Insects, Spiders, Ticks, Poisonous Plants	 Personnel will be instructed to be cautious of insects, spiders, ticks, and poisonous plants. Workers will tuck pants into socks and wear long sleeves and sturdy leather boots when walking in tall grass. Workers will use insect repellent when needed. 	L
х		Injuries from Working with Hand and Power Tools	 Tools shall be inspected prior to use. All power tools originally equipped with a safety guard of any type shall be used only with the guard in place and functioning properly. Defective tools shall be tagged and removed from service. Tools shall only be used for their intended purpose. 	L

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
х		Chemical Exposure	 MSDSs are required for all chemicals brought to the site. The MSDS book will be kept in the job trailer and will be available to all employees. 	L
Х		Spills	 Spill clean up materials will be located on the site. SSO is to be notified immediately of the spill, regardless of the size or material spilled. 	L
Х		Back Strain	 Use proper lifting techniques at all times. Request assistance from other personal when weight limits exceeds 50lbs. 	L
Х		Hand Injuries	 Wear protective gloves; use hand tools in a safe manner and keep hand tools in good working condition. 	L
Х		Slips, Trips, & Falls	 Use extreme caution when walking in work areas, working on or around truck beds, and around equipment during unloading and staging activities. 	L
x		Contact with Heavy Equipment While in Use	 Only trained and experienced personnel will be allowed to stage and unload heavy equipment. Only trained operators will be authorized to operate equipment. High visibility vests will be worn at all times while working in or around heavy equipment, trucks, or other mechanized equipment. All ground personnel must maintain eye contact with operators at all times. Do not proceed toward or into blind spots of equipment without authorization to do so by the operator. All ground personnel will stay outside the swing radius of equipment while in operation. 	L
x		Refueling Equipment	 Shut down equipment during refueling. Allow equipment to cool down before refueling. Refuel from tank truck or OSHA-compliant portable fuel container. Container must be properly labeled. Personnel performing the refueling operation will exercise caution to avoid spillage. Absorbent pads will be kept near the refueling operations. Prior to fueling, personnel shall bond the heavy equipment to fueling equipment. A fire extinguisher will be located in the immediate area during refueling operations. Secured fuel tanks will be allowed in company pick-up trucks. Fire extinguishers and proper labels are required if transporting fuel. 	L
x		Controlling Work Areas	 Fencing, tape, cones or other SSO-approved boundaries will be erected to warn approaching personnel of the hazardous area. Appropriate signs will be posted at the boundary to instruct personnel in entry requirements. 	L

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
x	Welding/Cutting	Hand, Foot,Head, & Eye Injury	 Employees must wear a welding helmet (filters w/ shade #10, #12, #14), leather gloves and boots, oil-free protective garments, dry and hole free insulating gloves, steel toed boots, flame-resistant coveralls that are cuffless, and hearing protection. Do not touch live electrical parts. Insulate yourself from work and ground using dry insulating mats. Always verify the supply ground. When making input connections, attach proper grounding conductor first. Inspect power cord for damage or bare wiring. Replace immediately if damaged. Warn others not to watch the arc and, if necessary, use a protective screen or barrier to protect others from flash and glare. Monitor indoor welding gases and ensure ventilation is effective. Work in a well ventilated area. 	L
x		Fire Hazards	 Do not cut or weld where sparks can strike flammable materials. Remove all flammables and combustibles within 35 feet of the welding arc or cut location. Keep a fire extinguisher in the welding area. Prior to refueling, stop the engine and let it cool off. 	Μ
x	Compressed Cylinders	Fire/Explosive Hazards	 Cylinders should be secured and restrained in an upright position and stored at least 20 feet from any fuel, gas or diesel tanks. Keep away from exposure to open flame. All cylinders must be labeled and indicated when empty. Check all valves and fittings for leaks with each use. If a leak is found, tag it and report it. Leak test all connections using soap solution where possible. Keep valve caps screwed on at all times when moving the cylinder or when regulators and gauges are unattached. Close the cylinder valve and bleed off the pressure in the hoses when not in use. Never tamper with cylinder valves or safety devices. Cylinders should not be lifted by the protective valve caps. 	Μ

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
x	Heater Circuit/Equipment Maintenance	Electrical Shock, Burns	 Access to the electrical distribution panels and the heater element electrical junction boxes will be restricted to authorized personnel only. Electrical components will be equipped with appropriate warning labels (i.e., high voltage, arc flash, etc.) as required by the NEC. Follow OSHA electrical regulations (29 CFR 1910.333) and National Electrical Code (NFPA 70 and 70E) and TerraTherm Lock-out/Tagout procedure. Only qualified persons may work on energized electrical circuit parts or equipment or perform testing work on energized electrical circuits or equipment. Even qualified persons working near exposed energized electrical parts cannot approach closer than ONE foot of a system that is OVER 300 volts but NOT OVER 750 volts. Closer approaches by qualified personnel may be possible if wearing insulated gloves with the proper voltage rating. Wear rubber insulated gloves. Wear arc flash protective PPE when working on energized electrical equipment. 	М
x	Soil Sampling	Dermal-Burns/Ingestion/Inhalation Hazard	 Nitrile® gloves should be worn at all times during soil sampling collection. Continuously monitor boring and breathing space of drilling personnel for potential vapors. Use extreme care when handling core barrels as subsurface temperatures in the wellfield often reach greater than 212°F. Immediately cover ends of core barrels with Teflon® tape and end cap to stop volatilization. After cooling, carefully remove end cap and Teflon® tape from core barrel. Collect aliquot from center of core barrel and place in laboratory preserved (typically acid) glassware. Cap and cover immediately to reduce dermal contact or inhalation of acid. 	L
x		Contact with Utilities	 Above-ground utilities must be visibly identified with warning signs. Any vehicle or mechanical equipment capable of having parts of its structure elevated (drill ring, crane, etc.) near energized overhead lines shall be operated so that a clearance of at least 10 feet is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over. 	М

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
x		Hand, Foot,Head, & Eye Injury	 Personnel shall not remain in the vicinity of operating equipment unless it is required for their work responsibilities. All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. This device must be tested prior to job initiation and periodically thereafter. The drill crews shall not simultaneously handle augers while the rig is operating unless there is a standby person to activate the emergency stop. The driller/operator must never leave the controls while the tools are rotating/driving unless all personnel are kept clear of rotating equipment. A long-handled shovel or equivalent must be used to clear drill cuttings away from the hole and from rotating/driving tools. Hands and/or feet are not to be used for this purpose. Samplers must not reach into or near the rotating equipment. If personnel must work near any tools that could rotate, the driller/ operator must shut down the rig prior to initiating such work. Drillers, helpers, and technicians must secure all loose clothing, or other items that could become entangled in the machinery when in the vicinity of drilling/driving operations. Only equipment that has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers/casing segments shall not be allowed. No person shall climb the drill mast without the use of ANSI-approved fall protection (approved belts, lanyards, and a fall protection slide rail) or portable ladder that meets the requirements of OSHA standards. 	М
Х		Overhead Clearance	• Do not transport drilling equipment with mast in the upward position.	L
х		Environmental	Channel the discharge of drilling fluids away from the work area. Contain fluids if contaminated. Control dust.	L
Х		Slips, Trips, & Falls	Cap and flag open boreholes.	L
Х	Vapor Sampling	Dermal-Burns/Ingestion/Inhalation Hazard	 Leather gloves and face shield should be worn during vapor sample collection. Keep eyes, mouth, and extremities clear of vapor stream. Allow Tedlar[®] bag to cool to ambient temperature before handling. 	L
Х				

	Add Items		
	EQUIPMENT	TRAINING	INSPECTION
Х			

Involved Personnel:

TerraTherm and associated subcontractors.

Acceptance Authority (digital signature):

Overall Risk Assessment Code (RAC) (Use highest code)

М

Activity: TCH System Mobilization & Construction

Project: SRSNE Superfund Site

Activity Location: Thermal Treatment Zone

Prepared By: Robin Swift

Date: 1 April 2010

		115	N/155C55					
		E = Extremely High Risk H = High Risk	Probability					
		M = Moderate Risk L = Low Risk	Frequent	Likely	Occasional	Seldom	Unlikely	
	S	Catastrophic	E	E	Н	Н	М	
	v e	Critical	E	Н	Н	М	L	
	r i	Marginal	Н	М	М	L	L	
	y	Negligible	М	L	L	L	L	

Risk Assessment Code Matrix

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
x	General Construction	Temperature Extremes	 Employees shall be trained in the recognition of heat stress symptoms and appropriate precautions to take. Heat stress controls will be implemented per the Health and Safety Plan. The SSO will monitor personnel for signs of heat stress. Personnel will maintain fluid levels to avoid dehydration. 	L
x		Noise Hazards	 Noise levels that exceed the OSHA PEL of 90 dBA for an 8-hour day require hearing protection. Employees must follow this general rule of thumb: If the noise levels are such that you must shout at someone 5 feet away from you, you need to be wearing hearing protection. Employees can wear either disposable earplugs or earmuffs but all hearing protection must have a minimum noise reduction rating (NRR) of 27 db. 	L
х		Severe Weather	 When weather interferes with safety, all work will stop until conditions are safe. Work will stop and personnel will seek shelter during lightning storms. 	L
x		Insects, Spiders, Ticks, Poisonous Plants	 Personnel will be instructed to be cautious of insects, spiders, ticks, and poisonous plants. Workers will tuck pants into socks and wear long sleeves and sturdy leather boots when walking in tall grass. Workers will use insect repellent when needed. 	L
x		Injuries from Working with Hand and Power Tools	 Tools shall be inspected prior to use. All power tools originally equipped with a safety guard of any type shall be used only with the guard in place and functioning properly. Defective tools shall be tagged and removed from service. Tools shall only be used for their intended purpose. 	L

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
x		Chemical Exposure	 MSDSs are required for all chemicals brought to the site. The MSDS book will be kept in the job trailer and will be available to all employees Use proper PPE suitable for the potential chemical exposure. 	L
Х		Spills	 Spill clean up materials will be located on the site. SSO is to be notified immediately of the spill, regardless of the size or material spilled. 	L
Х	Unloading Equipment & TCH System Construction	Back Strain	Use proper lifting techniques at all times. Request assistance from other personal when weight limits exceeds 50lbs.	L
Х		Hand Injuries	Wear protective gloves; use hand tools in a safe manner and keep hand tools in good working condition.	L
Х		Slips, Trips, & Falls	 Use extreme caution when walking in work areas, working on or around truck beds, and around equipment during unloading and staging activities. 	L
x		Contact with Heavy Equipment While in Use	 Only trained and experienced personnel will be allowed to stage and unload heavy equipment. Only trained operators will be authorized to operate equipment. High visibility vests will be worn at all times while working in or around heavy equipment, trucks, or other mechanized equipment. All ground personnel must maintain eye contact with operators at all times. Do not proceed toward or into blind spots of equipment without authorization to do so by the operator. All ground personnel will stay outside the swing radius of equipment while in operation. 	L
x		Refueling Equipment	 Shut down equipment during refueling. Allow equipment to cool down before refueling. Refuel from tank truck or OSHA-compliant portable fuel container. Container must be properly labeled. Personnel performing the refueling operation will exercise caution to avoid spillage. Absorbent pads will be kept near the refueling operations. Prior to fueling, personnel shall bond the heavy equipment to fueling equipment. A fire extinguisher will be located in the immediate area during refueling operations. Secured fuel tanks will be allowed in company pick-up trucks. Fire extinguishers and proper labels are required if transporting fuel. 	L
x		Controlling Work Areas	 Fencing, tape, cones or other SSO-approved boundaries will be erected to warn approaching personnel of the hazardous area. Appropriate signs will be posted at the boundary to instruct personnel in entry requirements. 	L

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
x	TCH Wellfield Installation	Contact with Utilities	 Contact local state operated "Digsafe" service or dial 811 (nationwide) to locate and identify underground utilities. Once utilities are located, mark them with paint or flags. In the absence of identified utilities, it may be necessary to identify a no drill zone or hand dig in the proposed drilling locations. Barricade open excavations. Communicate all utility markings at daily job planning reviews and weekly safety tailgate meetings. Above-ground utilities must be visibly identified with warning signs. Any vehicle or mechanical equipment capable of having parts of its structure elevated (drill ring, crane, etc.) near energized overhead lines shall be operated so that a clearance of at least 10 feet is maintained. If the voltage is higher than 50kV, the clearance shall be increased 4 inches for every 10kV over. 	Μ
×		Hand, Foot,Head, & Eye Injury	 Personnel shall not remain in the vicinity of operating equipment unless it is required for their work responsibilities. All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. This device must be tested prior to job initiation and periodically thereafter. The drill crews shall not simultaneously handle augers while the rig is operating unless there is a standby person to activate the emergency stop. The driller/operator must never leave the controls while the tools are rotating/driving unless all personnel are kept clear of rotating equipment. A long-handled shovel or equivalent must be used to clear drill cuttings away from the hole and from rotating/driving tools. Hands and/or feet are not to be used for this purpose. Samplers must not reach into or near the rotating equipment. If personnel must work near any tools that could rotate, the driller/ operator must shut down the rig prior to initiating such work. Drillers, helpers, and technicians must secure all loose clothing, or other items that could become entangled in the machinery when in the vicinity of drilling/driving operations. Only equipment that has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers/casing segments shall not be allowed. No person shall climb the drill mast while tools are rotating/operating. No person shall climb the drill mast while tools are rotating/operating. No person shall climb the drill mast while tools are rotating/operating. No person shall climb the drill mast while tools are rotating/operating. 	М
Х		Overhead Clearance	• Do not transport drilling equipment with mast in the upward position.	L
х		Environmental	 Channel the discharge of drilling fluids away from the work area. Contain fluids if contaminated. Control dust. 	L

	JOB STEPS	HAZARDS	OS ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS		
Х		Slips, Trips, & Falls	Cap and flag open boreholes.	L	
x	Welding/Cutting	Hand, Foot,Head, & Eye Injury	 Employees must wear a welding helmet (filters w/ shade #10, #12, #14), leather gloves and boots, oil-free protective garments, dry and hole free insulating gloves, steel toed boots, flame-resistant coveralls that are cuffless, and hearing protection. Do not touch live electrical parts. Insulate yourself from work and ground using dry insulating mats. Always verify the supply ground. When making input connections, attach proper grounding conductor first. Inspect power cord for damage or bare wiring. Replace immediately if damaged. Warn others not to watch the arc and, if necessary, use a protective screen or barrier to protect others from flash and glare. Monitor indoor welding gases and ensure ventilation is effective. Work in a well ventilated area. 	L	
Х		Fire Hazards	 Do not cut or weld where sparks can strike flammable materials. Remove all flammables and combustibles within 35 feet of the welding arc or cut location. Keep a fire extinguisher in the welding area. Prior to refueling, stop the engine and let it cool off. 	М	
x	Compressed Cylinders	Fire/Explosive Hazards	 Cylinders should be secured and restrained in an upright position and stored at least 20 feet from any fuel, gas or diesel tanks. Keep away from exposure to open flame. All cylinders must be labeled and indicated when empty. Check all valves and fittings for leaks with each use. If a leak is found, tag it and report it. Leak test all connections using soap solution where possible. Keep valve caps screwed on at all times when moving the cylinder or when regulators and gauges are unattached. Close the cylinder valve and bleed off the pressure in the hoses when not in use. Never tamper with cylinder valves or safety devices. Cylinders should not be lifted by the protective valve caps. 	Μ	
x	Cover Installation	Inhalation/Dermal Hazard	 • Cymine's should not be inted by the protective valve caps. • Personnel may wear a dust mask in addition to general construction PPE if needed. • Stand upwind while fly ash is being transferred into hopper/mixture. • Stay clear (upwind) while cover is being sprayed. • Thoroughly wash hands, skin and equipment to remove any concrete dust or residue. 	L	

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
x	Equipment Installation	Back Strain	 Practice proper lifting techniques. Use mechanical devices to move objects that are too heavy to be moved manually. If mechanical devices are not available, ask another person to assist you. Bring a card table into the field so that work can be performed at waist level versus bending over from the ground surface. 	L
Х		Hand Injury	Prior to lifting, consider how the object will be set down without pinching or crushing hands or fingers.	L
Х		Slips, Trips, & Falls	 Inspect objects for slippery surfaces (i.e., grease) before lifting. Be sure the path you are taking while carrying a heavy object is free of obstructions and slips, trip and fall hazards. 	L
х		Falling Objects/Debris	 Wear hard hats when overhead hazards are present Only authorized personnel shall operate forklifts Inspect slings or straps before use – Do not use damaged or frayed slings. 	L
x	Electrical Installation	Electrical Shock, Burns	 Access to the electrical distribution panels and the heater element electrical junction boxes will be restricted to authorized personnel only. Electrical components will be equipped with appropriate warning labels (i.e., high voltage, arc flash, etc.) as required by the NEC. Follow OSHA electrical regulations (29 CFR 1910.333) and National Electrical Code (NFPA 70 and 70E) and TerraTherm Lockout-Tagout Procedure. Only qualified persons may work on energized electrical circuit parts or equipment or perform testing work on energized electrical circuits or equipment. Even qualified persons working near exposed energized electrical parts cannot approach closer than ONE foot of a system that is OVER 300 volts but NOT OVER 750 volts. Closer approaches by qualified personnel may be possible if wearing insulated gloves with the proper voltage rating. Wear rubber insulated gloves with a voltage rating of up to 1,000 volts (class O glove). Leather protector gloves will be worn over the rubber insulating gloves. Wear arc flash protective PPE when working on energized electrical equipment. 	Μ

	Add Items		
	EQUIPMENT	TRAINING	INSPECTION
Х			

NWW Form 385-1 (Revised) April 2008

Involved Personnel:

TerraTherm and associated subcontractors.

Acceptance Authority (digital signature):

Overall Risk Assessment Code (RAC) (Use highest code)

Μ

 Date:
 1 April 2010
 Project:
 SRSNE Superfund Site

 Activity:
 TCH System Demobilization
 E = Extremely High
H = High Risk
M = Moderate Risk
L = Low Risk

 Activity Location:
 Thermal Treatment Zone
 E = Catastrophic
Catastrophic

 Prepared By:
 Robin Swift
 Critical

Risk Assessment Code Matrix

	E = Extremely High Risk H = High Risk	Probability					
	M = Moderate Risk L = Low Risk	Frequent	Likely	Occasional	Seldom	Unlikely	
S e v e r i t y	Catastrophic	E	E	Н	Н	М	
	Critical	E	Н	Н	М	L	
	Marginal	Н	М	М	L	L	
	Negligible	М	L	L	L	L	

Add Identified Hazards

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
х	System Demobilization	Temperature Extremes	 Employees shall be trained in the recognition of heat stress symptoms and appropriate precautions to take. Heat stress controls will be implemented per the Health and Safety Plan. The SSO will monitor personnel for signs of heat stress. Personnel will maintain fluid levels to avoid dehydration. 	L
х		Noise Hazards	 Noise levels that exceed the OSHA PEL of 90 dBA for an 8-hour day require hearing protection. Employees must follow this general rule of thumb: If the noise levels are such that you must shout at someone 5 feet away from you, you need to be wearing hearing protection. Employees can wear either disposable earplugs or earmuffs but all hearing protection must have a minimum noise reduction rating (NRR) of 27 db. 	L
Х		Severe Weather	 When weather interferes with safety, all work will stop until conditions are safe. Work will stop and personnel will seek shelter during lightning storms. 	L
Х		Insects, Spiders, Ticks, Poisonous Plants	 Personnel will be instructed to be cautious of insects, spiders, ticks, and poisonous plants. Workers will tuck pants into socks and wear long sleeves and sturdy leather boots when walking in tall grass. Workers will use insect repellent when needed. 	L
Х		Injuries from Working with Hand and Power Tools	 Tools shall be inspected prior to use. All power tools originally equipped with a safety guard of any type shall be used only with the guard in place and functioning properly. Defective tools shall be tagged and removed from service. Tools shall only be used for their intended purpose. 	L

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
x		Chemical Exposure	 MSDSs are required for all chemicals brought to the site. The MSDS book will be kept in the job trailer and will be available to all employees. Use proper PPE suitable for the potential chemical exposure. 	L
x		Spills	 Spill clean up materials will be located on the site. SSO is to be notified immediately of the spill, regardless of the size or material spilled. 	L
Х	Loading Equipment	Back Strain	Use proper lifting techniques at all times. Request assistance from other personal when weight limits exceeds 50lbs.	L
Х		Hand Injuries	Wear protective gloves; use hand tools in a safe manner and keep hand tools in good working condition.	L
x		Slips, Trips, & Falls	 Use extreme caution when walking in work areas, working on or around truck beds, and around equipment during unloading and staging activities. 	L
x		Contact with Heavy Equipment While in Use	 Only trained and experienced personnel will be allowed to stage and unload heavy equipment. Only trained operators will be authorized to operate equipment. High visibility vests will be worn at all times while working in or around heavy equipment, trucks, or other mechanized equipment. All ground personnel must maintain eye contact with operators at all times. Do not proceed toward or into blind spots of equipment without authorization to do so by the operator. All ground personnel will stay outside the swing radius of equipment while in operation. 	L
x		Refueling Equipment	 Shut down equipment during refueling. Allow equipment to cool down before refueling. Refuel from tank truck or OSHA-compliant portable fuel container. Container must be properly labeled. Personnel performing the refueling operation will exercise caution to avoid spillage. Absorbent pads will be kept near the refueling operations. Prior to fueling, personnel shall bond the heavy equipment to fueling equipment. A fire extinguisher will be located in the immediate area during refueling operations. Secured fuel tanks will be allowed in company pick-up trucks. Fire extinguishers and proper labels are required if transporting fuel. 	L
x		Controlling Work Areas	 Fencing, tape, cones or other SSO-approved boundaries will be erected to warn approaching personnel of the hazardous area. Appropriate signs will be posted at the boundary to instruct personnel in entry requirements. 	L
x		Falling Objects/Debris	 Only authorized personnel shall operate forklifts. Inspect slings or straps before use – Do not use damaged or frayed slings. 	L

	JOB STEPS	HAZARDS	ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS	RAC
x	Electrical System Demobilization	Electrical Shock, Burns	 Access to the electrical distribution panels and the heater element electrical junction boxes will be restricted to authorized personnel only. Electrical components will be equipped with appropriate warning labels (i.e., high voltage, arc flash, etc.) as required by the NEC. Follow OSHA electrical regulations (29 CFR 1910.333) and National Electrical Code (NFPA 70 and 70E) and TerraTherm Lockout-Tagout procedure. Only qualified persons may work on energized electrical circuit parts or equipment or perform testing work on energized electrical circuits or equipment. Even qualified persons working near exposed energized electrical parts cannot approach closer than ONE foot of a system that is OVER 300 volts but NOT OVER 750 volts. Closer approaches by qualified personnel may be possible if wearing insulated gloves with the proper voltage rating. Wear rubber insulated gloves with a voltage rating of up to 1,000 volts (class O glove). Leather protector gloves will be worn over the rubber insulating gloves. Wear arc flash protective PPE when working on energized electrical equipment. 	Μ

	Add Items		
	EQUIPMENT	TRAINING	INSPECTION
Х			

Involved Personnel:

TerraTherm and associated subcontractors.

Acceptance Authority (digital signature):



Attachment C

OSHA/EPA Occupational Chemical Database Reports and MSDS for COCs

OSHA/EPA Occupational Chemical Database - Full Report

) STATES FMENT ())F LABO	R					OL 💿 OSHA	Advanced Search
Occupation	al Safety &	Health Adm	inistration			A to Z Index	En Español Co	ntact Us What's	New About OSHA
	2							Taut Cine	
USHA HUITIe						M KSS Feeds	Print This Page	E H Text Size	E-Mail This Page
	pational C	hemical	Databas	е					
Chemical Identifica									
CAS #: 1314-13-2 Synonyms: Zinc peroxide	DXIDE, FUME	UN No:	3077		Formula	a: ZnO			
Physical Properties	5]	
Physical Description:	Vhite, odorless	solid.							
BP: NA	MW : 81.4		LEL: NA	NFPA Fire F	Rating: NA				
FRZ/MLT: MLT: 3587°F	VP: 0 mmHg	g (approx)	UEL: NA	NFPA Healt	th Rating: NA				
FP: NA	VD: NA		4	NFPA Reac	tivity Rating: NA				
Sp. GR: 5.61	Sp. GR: 5.61 IP: NA		NFPA Sp. I	nst.: NA					
								7	
Exposure Limits									
OSHA		NIOSH			Related Inform	ation			
PEL-TWA ppm: NA		REL-TWA p	pm: NA		AIHA Emergenc	y Response Pla	anning Guidelines		
PEL-TWA mg/m3: 5		REL-TWA n	ng/m3 : 5		NA	-2/ERPG-3.			
PEL-STEL ppm: NA	PEL-STEL ppm: NA REL-STEL ppm: NA			_					
PEL-STEL mg/m3: NA		REL-STEL r	ng/m3: 10						
PEL-C ppm: NA		REL-C ppm	: NA					_	
PEL-C mg/m3: NA		REL-C mg/	m3: NA						
		Skin Notati	ION: NO						
Notes. NA			ΝΛ						
			n3.500		[
		IDLH Note	s: NA						
<u>P</u>		1							
NIOSH Pocket Gui	de to Chem	nical Hazar	ds (Curre	ent through	June 2006)]	
Zinc oxide						CAS: 1314-13-2	2		
Formula: ZnO					RTECS: ZH4810000				
Synonyms & Trade Name	s: Zinc peroxid	e				DOT ID & Guid	e: 1516 143		
Exposure Limits									
NIOSH REL: Dust: TWA 5 mg/m3 ST 10 mg/m3	mg/m3 C 15 r	ng/m3 Fume:	TWA 5	OSHA PEL : T 5 mg/m3 (res	WA 5 mg/m3 (fume p dust)	e) TWA 15 mg/m	3 (total dust) TWA		
IDLH: 500 mg/m3				Conversion: N	IA				
Physical Description									
White, odorless solid.	i			1		1			
MW: 81.4	BP: ?			MLT: 3587F		Sol(64F): 0.000	4%		
VP: 0 mmHg (approx)	IP: N	A		RGasD: NA		Sp.Gr: 5.61		_	
FI.P: NA	UEL:	NA		LEL: NA		MEC: NA			
Noncombustible Solid (Se	e flammable ar	nd combustible	e liquid classe	<u>es</u>)				_	
Chlorinated subbas (at 41		to Cloube de -	omposed by	wator ¹				-	
Measurement Mothed	sr), water [NO	Le. Slowly dec	omposed by	water.j				-	
NIOSH 7303 7502 OSH	יייי 10121 10143							-	
Personal Protection &	Personal Protection & Sanitation First Aid								
Skin: N.R.								1	
Eyes: N.R. Wash skin: N.R. Remove: N.R. Change: N.R.				Breath: Resp s	support r <u>es</u>)				

NIOSH Respirator Recommendations

OSHA/EPA Occupational Chemical Database - Full Report

NIOSH/OSHA 50 mg/m3: DMFu/SA 125 mg/m3: SA:CF/PAPRDMFu 250 mg/m3: HiEF/SAT:CF/PAPRTHiE/SCBAF/SAF 500 mg/m3: SA:PD,PP : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE (See symbols and codes) Exposure Routes Inh

Symptoms

Metal fume fever: chills, musc ache, nau, fever, dry throat, cough; weak, lass; metallic taste; head; blurred vision; low back pain; vomit; ftg; mal; tight chest; dysp, rales, decr pulm func (See abbreviations)

Target Organs

Resp sys (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 171

171 Substances (Low to Moderate Hazard) POTENTIAL HAZARDS

FIRE OR EXPLOSION

- Some may burn but none ignite readily.
- * Those substances designated with a P may polymerize explosively when heated or involved in a fire.
- * Containers may explode when heated.
- * Some may be transported hot.

HEALTH

- * Inhalation of material may be harmful.
- * Contact may cause burns to skin and eyes.
- * Inhalation of Asbestos dust may have a damaging effect on the lungs.
- * Fire may produce irritating, corrosive and/or toxic gases.
- * Runoff from fire control may cause pollution.

PUBLIC SAFETY

- * CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate
- telephone number listed on the inside back cover.
 * Isolate spill or leak area immediately for at least 10 to 25 meters
- (30 to 80 feet) in all directions.
- * Keep unauthorized personnel away.

* Stay upwind.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
 Structural firefighters' protective clothing will only provide limited
- protection.

EVACUATION

Fire

* If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

Small Fires

* Dry chemical, CO2, water spray or regular foam.

Large Fires

- * Water spray, fog or regular foam.
- Move containers from fire area if you can do it without risk.
- * Do not scatter spilled material with high pressure water streams.
- * Dike fire-control water for later disposal.
- Fire involving Tanks
- Cool containers with flooding quantities of water until well after fire is out.
- * Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- * ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- * Do not touch or walk through spilled material.
- * Stop leak if you can do it without risk.
- Prevent dust cloud.
- Avoid inhalation of asbestos dust.
- Small Dry Spills
- With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.
- Small Spills
- ⁴ Take up with sand or other noncombustible absorbent material and place into containers for later disposal.
- Large Spills
- Dike far ahead of liquid spill for later disposal.
- Cover powder spill with plastic sheet or tarp to minimize spreading.
- Prevent entry into waterways, sewers, basements or confined areas.

FIRST AID

Move victim to fresh air.
h –	
*	Call 911 or emergency medical service

- * Apply artificial respiration if victim is not breathing.
- * Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
 In case of contact with substance, immediately flush skin or eyes with
- running water for at least 20 minutes.
- * Ensure that medical personnel are aware of the material(s) involved,
- and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Keep material dry. Disperse vapors using fans or blowers. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. Water spill: Neutralize with agricultural lime (CaO), crushed limestone (CaCO3), or sodium bicarbonate (NaHCO3). Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999)

Firefighting: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) (AAR, 1999)

Reactivity: This compound is incompatible with the following:Chlorinated rubber (at 419F), water [Note: Slowly decomposed by water.] (NIOSH, 1997)

First Aid: Breathing: If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible. (NIOSH, 1997)

Freedom of Information Act | Privacy & Security Statement | Disclaimers | Customer Survey | Important Web Site Notices | International | Contact

U.S. Department of Labor | Occupational Safety & Health Administration | 200 Constitution Ave., NW, Washington, DC 20210 Telephone: 800-321-OSHA (6742) | TTY: 877-889-5627

www.OSHA.gov

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	STATES MENTA) Ng lara-	D						SEARCH
Occupationa	al Safety & I	Health Adm	inistration			A to Z Index	En Español Cor	ntact Us What's	New About OSHA
						_	-		-
OSHA Home						RSS Feeds	Print This Page	🗖 🛨 Text Size	🐱 E-Mail This Page
OSHA/EPA Occup	ational C	hemical [Database	÷					
-									
Chemical Identificat	tion								
Chemical Name: XYLENE	, ALL ISOMERS	5							
CAS #: 1330-20-/	methylbenzen	UN NO:	130/ or para)-Yvle	ne: o(m or n)-	Formula:	: C8H10			
Synonyms . 1,2(5 01 4) Di	meanyibenzen				Xylol				
Physical Properties]	
Physical Description: Co	olorless liquid v	with an aromat	tic odor. [Not	e: A solid belo	w 56ºF.]			1	
BP: 281ºF	MW: 106.2		LEL: 0.9-	NFPA Fire F	Rating: 3			1	
			1.1%					-	
FRZ/MLT: FRZ: NA	VP: 9 mmHg	I	7.0%	NFPA Healt	th Rating: 2				
FP: 81-90°F	VD: NA			NFPA Reac	tivity Rating: 0			1	
Sp. GR: 0.86-0.88	IP: 8.44-8.5	6 eV		NFPA Sp. II	nst.: NA]	
								-	
Exposure Limits									
OSHA		NIOSH			Related Informat	tion		1	
PEL-TWA ppm: 100		REL-TWA p	pm: 100		AIHA Emergency	Response Pla	nning Guidelines	1	
PEL-TWA mg/m3: 435		REL-TWA m	ig/m3 : 435		- ERPG-1/ERPG-	2/ERPG-3:			
PEL-STEL ppm: NA		REL-STEL p	pm : 150						
PEL-STEL mg/m3: NA		REL-STEL m	ng/m3 : 655]				
PEL-C ppm: NA		REL-C ppm:	NA]	
PEL-C mg/m3: NA		REL-C mg/r	m3 : NA		Carcinogen Class	ifications: IAR	C-3, TLV-A4		
Skin Notation: No		Skin Notati	on: No		_				
Notes: NA		Notes: NA			4				
		IDLH ppm:	900		_				
		IDLH mg/m	g/m3: NA		_				
		IDLH Notes	: NA					J	
NTOCH Dealest Cuid	la ta Chana	icol Horow	de (Cuma		1.upa 2000)			1	
NIOSH POCKET GUID	le to Chem	iical Hazar	as (Currer	nt through	June 2006)				
NA						CAS: NA			
Formula: NA						RTECS: NA		-	
Synonyms & Trade Names	: NA						e: NA	-	
					•				
				Conversion: N	ς ΙΔ			1	
Physical Description								1	
Description: NA								1	
MW: NA	BP: NA	4		FRZ: NA		Sol: NA		1	
VP: NA	IP: NA			RGasD: NA		SG: NA			
FP: NA	UEL: N	IA	LEL: NA			MEC: NA		1	
NA (See flammable and combustible liquid classes)				•		1			
Incompatibilities & Rea	ctivities							1	
NA]	
Measurement Methods									
NA									
Personal Protection & Sanitation First Aid			First Aid						
NA		NA (See procedur	rec)						
NIOSH Respirator Reco	mmendation	IS			<u></u>)				
NA		-						1	
(See symbols and codes)									

NA	
Symp	toms
VA A	
See a	bbreviations)
Гarge	et Organs
NA	
See a	bbreviations)
DOT	Emergency Response Guidebook (ERG 2004)
Guide	Number: 130
	terres alte time de la constant de l
130 F 20TF	iammable Liquids (Non-Polar/ Water-immiscible/ Noxious) NTIAL HAZARDS
FIRE	OR EXPLOSION
*	HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
* +	Vapors may form explosive mixtures with air.
r k	Vapors may travel to source of ignition and flash back. Most vapors are beavier than air. They will spread along ground and
	collect in low or confined areas (sewers, basements, tanks).
ĸ	Vapor explosion hazard indoors, outdoors or in sewers.
ĸ	Those substances designated with a P may polymerize explosively when
۱	neated or involved in a fire.
K	Kunon to sewer may create fire or explosion hazard.
*	Many liquids are lighter than water.
HEAL	TH
*	May cause toxic effects if inhaled or absorbed through skin.
* *	Inhalation or contact with material may irritate or burn skin and eyes.
*	rine will produce initiality, conosive ana/or toxic gases. Vanors may cause dizziness or suffocation
*	Runoff from fire control or dilution water may cause pollution.
PUBL	IC SAFETY
*	CALL Emergency Response Telephone Number on Shipping Paper first. If
	Shipping Paper not available or no answer, refer to appropriate
ا ٭	Isolate spill or leak area immediately for at least 50 to 100 meters
((160 to 330 feet) in all directions.
*	Keep unauthorized personnel away.
*	Stay upwind.
* *	Keep out of low areas. Ventilate closed spaces before entering
PROT	Ventilate closed spaces before entering.
*	Wear positive pressure self-contained breathing apparatus (SCBA).
*	Structural firefighters' protective clothing will only provide limited
	protection.
Large	Snill
*	Consider initial downwind evacuation for at least 300 meters
((1000 feet).
Fire	Té tradu un il seu su tradute in investo d'un a fina 1000 ATE C
т (IT TANK, TAIL CAR OF TANK TRUCK IS INVOLVED IN A TIPE, ISOLATE FOR
2	evacuation for 800 meters (1/2 mile) in all directions
EMER	GENCY RESPONSE
FIRE	
CAUTI	ON: All these products have a very low flash point: Use of water spray
Small	when fighting fire may be inefficient.
lldll د *	Dry chemical, CO2, water spray or regular foam.
arge	Fires
k _	Water spray, fog or regular foam.
k F	Do not use straight streams.
iro in	Move containers from fire area if you can do it without risk.
* *	Fight fire from maximum distance or use unmanned hose holders or
I	nonitor nozzles.
k	Cool containers with flooding quantities of water until well after
t د	iire is out. Withdraw immediately in case of vicing cound from working orfet :
	withuraw infinediately in case of rising sound from venting safety levices or discoloration of tank
) ۲	ALWAYS stay away from tanks engulfed in fire.
*	For massive fire, use unmanned hose holders or monitor nozzles; if this
i	s impossible, withdraw from area and let fire burn.
SPILL	OR LEAK
r ;	ELIMINATE all ignition sources (no smoking, flares, sparks or flames
ا *	All equipment used when handling the product must be grounded.
*	Do not touch or walk through spilled material.
*	Stop leak if you can do it without rick

Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Large Spills Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. FIRST AID Move victim to fresh air. Call 911 or emergency medical service. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers.

Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Apply "universal" gelling agent to immobilize spill. Apply approriate foam to diminish vapor and fire hazard. Water spill: Use natural barriers or oil spill control booms to limit spill travel. Use surface active agent (e.g. detergent, soaps, alcohols), if approved by epa. Inject "universal" gelling agent to solidify encircled spill and increase effectiveness of booms. If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999) **Firefighting**: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may spread fire. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. (AAR, 1999) **Reactivity**: CHEMICAL PROFILE: Xylene reacts with sulfuric acid, nitric acid, and strong oxidants liberating heat. (Handling Chemicals Safely 1980. p. 962). (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the victim is convulsing by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

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OSHA/EPA Occupational Chemical Database - Full Report Page 1 of 3 All DOL OSHA Advanced Search UNITED STATES SEARCH DEPARTMENT OF LABOR Occupational Safety & Health Administration A to Z Index | En Español | Contact Us | What's New | About OSHA **OSHA Home** 💦 RSS Feeds 🛛 🖨 Print This Page 🛛 🗖 🛨 Text Size 🖂 E-Mail This Page OSHA/EPA Occupational Chemical Database Chemical Identification Chemical Name: VINYL CHLORIDE CAS #: 75-01-4 Formula: C2H3Cl UN No: 1086 Synonyms: Chloroethene; Chloroethylene; Ethylene monochloride; Monochloroethene; Monochloroethylene; VC; Vinyl chloride monomer (VCM) Physical Properties Physical Description: Colorless gas or liquid (below 7°F) with a pleasant odor at high concentrations. [Note: Shipped as a liquefied compressed gas.] BP: 7°F MW: 62.5 LEL: 3.6% NFPA Fire Rating: 4 FRZ/MLT: FRZ: -256°F VP: 3.3 atm UEL: 33.0% NFPA Health Rating: 2 FP: NA (Gas) VD: 2.21 NFPA Reactivity Rating: 2 Sp. GR: NA IP: 9.99 eV NFPA Sp. Inst.: NA **Exposure** Limits OSHA NIOSH **Related Information** PEL-TWA ppm: 1 REL-TWA ppm: NA AIHA Emergency Response Planning Guidelines - ERPG-1/ERPG-2/ERPG-3: PEL-TWA mg/m3: NA REL-TWA mg/m3: NA NA PEL-STEL ppm: NA REL-STEL ppm: NA PEL-STEL mg/m3: NA REL-STEL mg/m3: NA PEL-C ppm: 5 REL-C ppm: NA Carcinogen Classifications: IARC-1, NIOSH-Ca, PEL-C mg/m3: NA REL-C mg/m3: NA NTP-K, OSHA-Ca, TLV-A1 Skin Notation: No Skin Notation: No Notes: SEE 29 CFR 1910.1017; 5 ppm Notes: CARCINOGEN (Ca); REDUCE IS THE AVERAGE CONCENTRATION EXPOSURE TO LOWEST FEASIBLE THAT MUST NOT BE EXCEEDED CONCENTRATION, USE 29 CFR DURING ANY PERIOD NOT EXCEED 15 1910.1017 MINUTES IDLH ppm: NA IDLH mg/m3: NA IDLH Notes: Ca NIOSH Pocket Guide to Chemical Hazards (Current through June 2006) CAS: 75-01-4 Vinyl chloride Formula: CH2=CHCl RTECS: KU9625000

Synonyms & Trade Names: Chloroethene, Chloroethylene, Ethylene monochloride, DOT ID & Guide: 1086 116P (inhibited)						
Exposure Limits	Exposure Limits					
NIOSH REL: Ca See Appendix A		OSHA PEL: [1910.1017] TWA 1 pp	om C 5 ppm [15-minute]			
IDLH: Ca [N.D.]		Conversion: 1 ppm = 2.56 mg/m3	3			
Physical Description						
Colorless gas or liquid (below 7F) with a pleasant odor at high concentrations. [Note: Shipped as a liquefied compressed gas.]						
MW: 62.5 BP: 7F		FRZ: -256F	Sol(77F): 0.1%			
VP: 3.3 atm	IP: 9.99 eV	RGasD: 2.21	SG: NA			
Fl.P: NA (Gas)	UEL: 33.0%	LEL: 3.6%	MEC: NA			
Flammable Gas (<u>See flammable and combustible liquid classes</u>)						
Incompatibilities & Reactivities						
Copper, oxidizers, aluminum, peroxides, iron, steel [Note: Polymerizes in air, sunlight, or heat unless stabilized by inhibitors such as phenol. Attacks iron & steel in presence of moisture.]						
Measurement Methods						
NIOSH 1007; OSHA 4, 75						
Personal Protection & Sanita	tion	First Aid				

Skin: Frostbite Eyes: Frostbite Wash skin: N.R. Remove: When wet (flamm) Change: N.R. Provide: Frostbite	Eye: Frostbite Skin: Frostbite Breath: Resp support (<u>See procedures</u>)			
NIOSH Respirator Recommendations				
NIOSH : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFS/SCBAE (See symbols and codes)				
Exposure Routes				
Inh Con (liquid)				
Symptoms				
Weak; abdom pain, GI bleeding; enlarged liver; pallor or cyan of extremities; liquid: frostbite; [carc] (<u>See abbreviations</u>)				
Target Organs				
Liver, CNS, blood, resp sys, lymphatic sys (See abbreviations)				

DOT	Emergency Response Guidebook (ERG 2004)
Guide	e Number: 116P
116 0	Gases - Flammable (Unstable)
POTE	
FIRE	
*	EXTREMELY FLAMMABLE.
*	Will be easily ignited by heat, sparks or flames.
*	Will form explosive mixtures with air.
*	Silane will ignite spontaneously in air
*	These substances designated with a D may polymerize explosively when
	Those substances designated with a P may polymenze explosively when
	neated or involved in a fire.
*	Vapors from liquefied gas are initially heavier than air and spread
	along ground.
*	Vapors may travel to source of ignition and flash back.
*	Containers may explode when heated
*	
Î.	vapors may cause dizziness or asphyxiation without warning.
*	Some may be toxic if inhaled at high concentrations.
*	Contact with gas or liquefied gas may cause burns, severe injury
	and/or frostbite.
*	Fire may produce irritating and/or toxic gases
DUR	
	All Berraney Despanse Telephone Number on Chinning Dener first. If
	CALL Emergency response relephone Number on Shipping Paper hist. If
	Shipping Paper not available or no answer, refer to appropriate
	telephone number listed on the inside back cover.
*	Isolate spill or leak area immediately for at least 100 meters
	(330 feet) in all directions.
*	Keen unauthorized personnel away
*	Stay unwind
	Stay upwinu.
Ť	Many gases are neavier than air and will spread along ground and
	collect in low or confined areas (sewers, basements, tanks).
*	Keep out of low areas.
PROT	FECTIVE CLOTHING
*	Wear positive pressure self-contained breathing apparatus (SCBA).
*	Structural firefighters' protective clothing will only provide limited
	intertion
I EVAC	
EVAC	
Large	Spill
*	Consider initial downwind evacuation for at least 800 meters
	(1/2 mile).
Fire	
*	If tank, rail car or tank truck is involved in a fire. ISOLATE for
	1 GOU meters (1 mile) in all directions: also consider initial
	To the meters of the construction of the const
	evacuation for 1600 meters (1 mile) in all directions.
EMER	RGENCY RESPONSE
FIRE	
*	DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS LEAK CAN BE STOPPED.
Small	Fires
*	Dry chemical or CO2
L argo	
Larye	
Î.	water spray or rog.
*	Move containers from fire area if you can do it without risk.
Fire ir	ivolving Tanks
*	Fight fire from maximum distance or use unmanned hose holders or
	monitor nozzles
*	Coll containers with flooding quantities of water until well after
	terois out
1	Do not direct water at source of leak or safety devices; icing may
	occur.
1.4	

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=439

- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Stop leak if you can do it without risk.
- Do not touch or walk through spilled material.
- Do not direct water at spill or source of leak.
- Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- If possible, turn leaking containers so that gas escapes rather than liauid.
- Prevent entry into waterways, sewers, basements or confined areas.
- Isolate area until gas has dispersed.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with liquefied gas, thaw frosted parts with lukewarm water
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

The letter P following the guide number identifies those materials which present a polymerization hazard under certain conditions. First responders at the scene of a dangerous goods incident should seek additional specific information about any material in guestion as soon as possible. The information received by contacting the appropriate emergency response agency, the emergency response number on the shipping document, or by consulting the information on or accompanying the shipping document, may be more specific and accurate than this guidebook in providing guidance for the materials involved.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Light sensitive, peroxidizable monomer may initiate exothermic polymerization of the bulk material (Handling Chemicals Safely 1980.. p. 958; Bretherick 1979. p. 160); with air, it forms polymeric peroxides which are explosive (Bretherick 1979. p. 164). An unstable polyperoxide is formed in vinyl chloride through oxidation by atmospheric oxygen in the presence of any of a variety of catalysts. Storage under these conditions for long periods increases the concentration of the polyperoxides to hazardous levels (MCA Case History 1551. 1969). (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: CAUTION: Exposure of skin to compressed gases may result in freezing of the skin. Treatment for frostbite may be necessary. Remove the victim from the source of contamination. IMMEDIATELY wash affected areas gently with COLD water (and soap, if necessary) while removing and isolating all contaminated clothing. Dry carefully with clean, soft towels. If symptoms such as inflammation or irritation develop, IMMEDIATELY call a physician or go to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: This compound is a gas, therefore inhalation is the first route of exposure. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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OSHA/EPA Occupational Chemical Database

Chemical Identification

 Chemical Name:
 VANADIUM, RESPIRABLE DUST & FUME, as V2O5

 CAS #:
 1314-62-1
 UN No:
 2862

Formula: 05V2

Synonyms: Divanadium pentoxide dust; Vanadic anhydride dust; Vanadium oxide dust; Vanadium pentaoxide dust Other synonyms vary depending upon the specific vanadium compound.

Physical Properties					
Physical Description: Yellow-orange powder or dark-gray, odorless flakes dispersed in air.					
BP: 3182°F (Decomposes) MW: 181.9 LEL: NA NFPA Fire Rating: NA					
FRZ/MLT: MLT: 1274°F	VP: 0 mmHg (approx)	UEL: NA	NFPA Health Rating: NA		
FP: NA	VD: NA		NFPA Reactivity Rating: NA		
Sp. GR: 3.36	IP: NA		NFPA Sp. Inst.: NA		

Exposure Limits			
OSHA	NIOSH	Related Information	
PEL-TWA ppm: NA	REL-TWA ppm: NA	AIHA Emergency Response Planning Guidelines	
PEL-TWA mg/m3: NA	REL-TWA mg/m3: NA	- ERPG-1/ERPG-2/ERPG-3:	
PEL-STEL ppm: NA	REL-STEL ppm: NA		
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA		
PEL-C ppm: NA	REL-C ppm: NA		
PEL-C mg/m3: 0.1	REL-C mg/m3: 0.05	Carcinogen Classifications: TLV-A4	
Skin Notation: No	Skin Notation: No		
Notes: FUME, 0.5 mg/m3 CEILING FOR RESPIRABLE DUST	Notes: 15 MINUTE CEILING, APPLIES TO TOTAL DUST, as V, EXCEPT VANADIUM METAL AND VANADIUM CARBIDE		
	IDLH ppm: NA]	
	IDLH mg/m3: 35		
	IDLH Notes: as V		

NIOSH Pocket Guide	e to Chemical Hazards (Cur	rent through June 2006)		
Vanadium fume	CAS: 1314-62-1			
Formula: V2O5			RTECS: YW2460000	
Synonyms & Trade Names: fume, Vanadium pentaoxide compound.	DOT ID & Guide: 2862 151			
Exposure Limits				
NIOSH REL: C 0.05 mg V/m3 [15-minute] OSHA PEL : C 0.1 mg V2O5/m3				
IDLH: 35 mg/m3 (as V)		Conversion: NA		
Physical Description				
Finely divided particulate di	spersed in air.			
MW: 181.9	BP: 3182F (Decomposes)	MLT: 1274F	Sol: 0.8%	
VP: 0 mmHg (approx)	IP: NA	RGasD: NA	Sp.Gr: 3.36	
FI.P: NA	UEL: NA	LEL: NA	MEC: NA	
Noncombustible Solid (See	flammable and combustible liquid clas	sses)		
Incompatibilities & Read	ctivities			
Lithium, chlorine trifluoride				
Measurement Methods				
NIOSH 7300, 7301, 7303, 7	7504; OSHA ID185			
Personal Protection & Sa	anitation	First Aid		
Skin: N.R.				

Advanced Search

Eyes: N.R. Wash skin: N.R. Remove: N.R. Change: N.R.	Breath: Resp support (<u>See procedures</u>)			
NIOSH Respirator Recommendations				
NIOSH (as V) 0.5 mg/m3: HiE*/SA* 1.25 mg/m3: SA:CF*/PAPRHiE* 2.5 mg/m3: HiEF/PAPRTHiE*/SCBAF/SAF 35 mg/m3: SAF:PD,PP : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE (See symbols and codes)				
Exposure Routes				
Inh Con				

Symptoms

Irrit eyes, throat; green tongue, metallic taste; cough, fine rales, wheez, bron, dysp; eczema (<u>See abbreviations</u>)

Target Organs

Eyes, skin, resp sys (<u>See abbreviations</u>)

DO	DOT Emergency Response Guidebook (ERG 2004)			
Guid	Guide Number: 151			
151	Substances - Toxic (Non-Combustible)			
РОТ	ENTIAL HAZARDS			
HEA	LTH			
*	Highly toxic, may be fatal if inhaled, swallowed or absorbed through			
*	Avoid any skin contact			
*	Effects of contact or inhalation may be delayed.			
*	Fire may produce irritating, corrosive and/or toxic gases.			
*	Runoff from fire control or dilution water may be corrosive and/or			
	toxic and cause pollution.			
	- UR EXPLOSION Non-combustible, substance itself does not burn but may decompose upon			
	heating to produce corrosive and/or toxic fumes.			
*	Containers may explode when heated.			
*	Runoff may pollute waterways.			
PUB	LIC SAFETY			
	CALL Entergency Response Telephone Number on Snipping Paper Inst. If Shipping Paper not available or no answer, refer to appropriate			
	telephone number listed on the inside back cover.			
*	Isolate spill or leak area immediately for at least 25 to 50 meters			
Ι.	(80 to 160 feet) in all directions.			
*	Keep unauthorized personnel away.			
*	Stay upwind.			
PRO	TECTIVE CLOTHING			
*	Wear positive pressure self-contained breathing apparatus (SCBA).			
*	Wear chemical protective clothing which is specifically recommended by			
*	the manufacturer. If may provide little or no thermal protection.			
	Subcural merginers protective country provides immed			
	situations.			
EVA	CUATION			
Spill	Care the Table of Initial Industry and Durberthus Artism Distances for			
Ť	See the Table of Initial Isolation and Protective Action Distances for			
	the downwind direction, as necessary, the isolation distance shown			
	under PUBLIC SAFETY.			
Fire				
*	If tank, rail car or tank truck is involved in a fire, ISOLATE for			
	avacuation for 800 meters (1/2 mile) in all directions; also, consider initial			
EME	RGENCY RESPONSE			
FIRE				
Smal	l Fires			
	Dry chemical, CO2 or water spray.			
*	Water spray, fog or regular foam.			
*	Move containers from fire area if you can do it without risk.			
*	Dike fire control water for later disposal; do not scatter the			
ч.	material.			
Fire i	Use water spray of fog; do not use straight streams.			
*	Fight first or call market leads			
	monitor nozzles.			
*	Do not get water inside containers.			
*	Cool containers with flooding quantities of water until well after			
*	IITE IS OUL. Withdraw immediately in case of rising sound from venting safety			
1	manardw initialities of their sound from venting succes			

- devices or discoloration of tank.
- * ALWAYS stay away from tanks engulfed in fire.
- * For massive fire, use unmanned hose holders or monitor nozzles; if this
- is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ^c Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- * Cover with plastic sheet to prevent spreading.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- * DO NOT GET WATER INSIDE CONTAINERS.

FIRST AID

- Move victim to fresh air.
- * Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
- * Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical
- device.
- * Administer oxygen if breathing is difficult.
- * Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- * For minor skin contact, avoid spreading material on unaffected skin.
- Keep victim warm and quiet.
- * Effects of exposure (inhalation, ingestion or skin contact) to
- substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. (AAR, 1999)

Firefighting: Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Ventilate closed spaces before entering them. Wear positive pressure breathing apparatus and special protective clothing. Remove and isolate contaminated clothing at the site.Small fires: dry chemical, carbon dioxide, water spray, or foam. Large fires: water spray, fog, or foam. Move container from fire area if you can do it without risk. Fight fire from maximum distance. Dike fire control water for later disposal; do not scatter the material. (EPA, 1998)

Reactivity: STABILITY: This chemical is stable under normal laboratory conditions. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions.REACTIVITY: This chemical can react with CIF3, Li, peroxyformic acid and (Ca+S+H2O). It also reacts with strong acids. (NTP, 1992)

First Aid: Signs and Symptoms of Acute Vanadium Pentoxide Exposure: Acute exposure to vanadium pentoxide may result in pulmonary irritation, bronchospasm, hemoptysis (coughing up of blood), pulmonary edema, emphysema, and pneumonia. Gastrointestinal effects may include nausea, abdominal cramping, diarrhea, anorexia, and black stools. Headache, dry mouth, dizziness, nervousness, insomnia, and tremor may be found. Vanadium pentoxide is irritating to the skin, eyes, and mucous membranes. Contact may result in a green staining of the tongue and skin. Blindness and epistaxis (bloody nose) are further complications. Emergency Life-Support Procedures: Acute exposure to vanadium pentoxide may require decontamination and life support for the victims. Emergency personnel should wear protective clothing appropriate to the type and degree of contamination. Air-purifying or supplied-air respiratory equipment should also be worn, as necessary. Rescue vehicles should carry supplies such as plastic sheeting and disposable plastic bags to assist in preventing spread of contamination. Inhalation Exposure: 1. Move victims to fresh air. Emergency personnel should avoid self-exposure to vanadium pentoxide. 2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support. 3. Obtain authorization and/or further instructions from the Localized hospital for administration of an antidote or performance of other invasive procedures. 4. Transport to a health care facility. Dermal/Eye Exposure: 1. Remove victims from exposure. Emergency personnel should avoid selfexposure to vanadium pentoxide. 2. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support. 3. Remove contaminated clothing as soon as possible. 4. If eye exposure has occurred, eyes must be flushed with lukewarm water for at least 15 minutes. 5. Wash exposed skin areas THOROUGHLY with soap and water. 6. Obtain authorization and/or further instructions from the Localized hospital for administration of an antidote or performance of other invasive procedures. 7. Transport to a health care facility. Ingestion Exposure: 1. Evaluate vital signs including pulse and respiratory rate, and note any trauma. If no pulse is detected, provide CPR. If not breathing, provide artificial respiration. If breathing is labored, administer oxygen or other respiratory support. 2. Obtain authorization and/or further instructions from the Localized hospital for administration of an antidote or performance of other invasive procedures. 3. Give the victims water or milk: children up to 1 year old, 125 mL (4 oz or 1/2 cup): children 1 to 12 years old, 200 mL (6 oz or 3/4 cup); adults, 250 mL (8 oz or 1 cup). Water or milk should be given only if victims are conscious and alert. 4. Vomiting may be induced with syrup of Ipecac. If elapsed time since ingestion of vanadium pentoxide is unknown or suspected to be greater than 30 minutes, do not induce vomiting and proceed to Step 5. Ipecac should not be administered to children under 6 months of age. Warning: Syrup of Ipecac should be administered only if victims are alert, have an active gag-reflex, and show no signs of impending seizure or coma. If ANY uncertainty exists, proceed to Step 5. The following dosages of Ipecac are recommended: children up to 1 year old, 10 mL (1/3 oz); children 1 to 12 years old, 15 mL (1/2 oz); adults, 30 mL (1 oz). Ambulate (walk) the victims and give large quantities of water. If vomiting has not occurred after 15 minutes, Ipecac may be readministered. Continue to ambulate and give water to the victims. If vomiting has not occurred within 15 minutes after second administration of Ipecac, administer activated charcoal. 5. Activated charcoal may be administered if victims are conscious and alert. Use 15 to 30 g (1/2 to 1 oz) for children, 50 to 100 g (1-3/4 to 3-1/2 oz) for adults, with 125 to 250 mL (1/2 to 1 cup) of water. 6. Promote excretion by administering a saline cathartic or sorbitol to conscious and alert victims. Children require 15 to 30 g (1/2 to 1 oz) of cathartic; 50 to 100 g (1-3/4 to 3-1/2 oz) is recommended for adults. 7. Transport to a health care facility. (EPA, 1998)

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Page 1 of 3



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Eve: Irr immed

Skin: Soap wash prompt

Skin: Prevent skin contact

Eyes: Prevent eye contact

DSITA EL A Occupational Chemical Database	- I un Report
Wash skin: When contam	Breath: Pesn support
Remove: When wet or contam	Swallow: Medical attention immed
Change: N.R.	(See procedures)
Provide: Eyewash, Quick drench	
NIOSH Respirator Recommendations	
NIOSH : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	
(See symbols and codes)	
Exposure Routes	
Inh Abs Ing Con	
Symptoms	
Irrit eves skin: head verti: vis dist fta aidd tremor som nau vo	mit: derm: card arrhy, pares: liver ini; [carc]
(See abbreviations)	
Target Organs	
Eves, skin, resp. svs, heart, liver, kidnevs, CNS	
(See abbreviations)	
DOT Emergency Perpense Guidebook (EPC 200/	1)
DOT LITIEI GETCY RESPONSE GUIDEDOOK (LKG 200-	ť)
Guide Number: 160	
1/0 Hale sense of Columna	
HEALTH	
 Vapors may cause dizziness or suffocation. 	
 Exposure in an enclosed area may be very harmful. Contact many imitate an hum align and sure 	
 Contact may irritate or burn skin and eyes. * Fire may produce irritating and/or toxic gases 	
* Runoff from fire control or dilution water may cause pollution	
FIRE OR EXPLOSION	
* Some of these materials may burn, but none ignite readily.	
 Most vapors are neavier than air. * Air/vapor mixtures may explode when ignited. 	
* Container may explode in heat of fire.	
PUBLIC SAFETY	
 CALL Emergency Response Telephone Number on Shipping P 	aper first. If
telephone number listed on the inside back cover	le la
* Isolate spill or leak area immediately for at least 25 to 50 me	ters
(80 to 160 feet) in all directions.	
* Keep unauthorized personnel away.	
 Stay upwind. Many gases are beavier than air and will spread along ground 	land
collect in low or confined areas (sewers, basements, tanks).	
* Keep out of low areas.	
* Ventilate closed spaces before entering.	
PROTECTIVE CLOTHING Wear positive pressure self-contained breathing apparatus (S	(BA)
* Structural firefighters' protective clothing will only provide lim	ited
protection.	
* Consider initial downwind evacuation for at least 100 meters.	
(330 feet).	
Fire	
* If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions: also, consider initial	
evacuation for 800 meters (1/2 mile) in all directions.	
EMERGENCY RESPONSE	
FIRE	
Small Fires	
Large Fires	
* Dry chemical, CO2, alcohol-resistant foam or water spray.	
* Move containers from fire area if you can do it without risk.	
 Dike fire control water for later disposal; do not scatter the material 	
Fire involving Tanks or Car/Trailer Loads	
* Fight fire from maximum distance or use unmanned hose hol	ders or
monitor nozzles.	
 cool containers with flooding quantities of water until well aft fire is out 	er
* Withdraw immediately in case of rising sound from venting sa	afety
devices or discoloration of tank.	·
* ALWAYS stay away from tanks engulfed in fire.	
SPILL OR LEAK * ELIMINATE all ignition sources (no smoking, flares, sports or	flames
in immediate area).	numes
* Stop leak if you can do it without risk.	
Small Liquid Spills	
r ake up with sand, earth or other noncombustible absorbent	materiai.

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=160

Large Spills

- Dike far ahead of liquid spill for later disposal.
- Prevent entry into waterways, sewers, basements or confined areas.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- Wash skin with soap and water.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Apply water spray or mist to knock down vapors. Combustion products include corrosive or toxic vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Water spill: If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999)

Firefighting: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) (AAR, 1999)

Reactivity: CHEMICAL PROFILE: It has been determined experimentally that mixtures of finely divided barium metal and a number of halogenated hydrocarbons possess an explosive capability. Specifically, impact sensitivity tests have shown that granular barium in contact with monofluorotrichloromethane, trichlorotrifluoroethane, carbon tetrachloride, trichloroethylene, or tetrachloroethylene can detonate (ASESB Pot. Incid. 39. 1968; Chem. Eng. News 46(9):38. 1968). It has been determined experimentally that a mixture of beryllium powder with carbon tetrachloride or with trichloroethylene will flash or spark on heavy impact (ASESB Pot. Incid. 39. 1968). A mixture of powdered magnesium with trichloroethylene or with carbon tetrachloride will flash or spark under heavy impact (ASESB Pot. Incid, 39. 1968). (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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FPA Occupational Chemical Database		

OSHA/EPA Occupational Chemical Database

Chemical Identification

X

OSHA Home

Chemical Name: THALLIUM, SOLUBLE COMPOUNDS, as TI CAS #: 7440-28-0 UN No: Synonyms: Synonyms vary depending upon the specific soluble thallium compound.

Formula: Tl

Physical Properties					
Physical Description: Light-gray to tan powder with a slightly aromatic odor.					
BP: NA	MW: 358.6	LEL: NA	NFPA Fire Rating: NA		
FRZ/MLT: MLT: 302°F	VP : 0.0000006 mmHg	UEL: NA	NFPA Health Rating: NA		
FP : 420°F	VD: NA		NFPA Reactivity Rating: NA		
p. GR: 1.10 IP: NA NFPA Sp. Inst.: NA					

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: NA	REL-TWA ppm: NA	AIHA Emergency Response Planning Guidelines
PEL-TWA mg/m3: 0.1	REL-TWA mg/m3 : 0.1	- ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: NA
Skin Notation: Yes	Skin Notation: Yes	
Notes: NA	Notes: NA	
	IDLH ppm: NA	
	IDLH mg/m3 : 15	
	IDLH Notes: NA	

NIOSH Pocket Guide to C	hemical Hazards (Curre	ent through June 2006)	
Thallium (soluble compo	ounds, as TI)		CAS: 7440-28-0
Formula: NA			RTECS: NA
Synonyms & Trade Names: Synony	rms vary depending upon the sp	ecific soluble thallium compound.	DOT ID & Guide: 1707 151 (compounds, n.o.s.)
Exposure Limits			
NIOSH REL: TWA 0.1 mg/m3 [skin]	OSHA PEL: TWA 0.1 mg/m3 [skii	n]
IDLH: 15 mg/m3 (as Tl)		Conversion: NA	
Physical Description			
Appearance and odor vary dependi	ng upon the specific soluble that	llium compound.	
Properties vary depending upon the specific soluble thallium compound.	BP: NA	FRZ: NA	Sol: NA
VP: NA	IP: NA	RGasD: NA	SG: NA
FP: NA	UEL: NA	LEL: NA	MEC: NA
NA (See flammable and combustible	<u>e liquid classes</u>)		
Incompatibilities & Reactivities	S		
Varies			
Measurement Methods			
NIOSH 7300, 7301, 7303, 9102; O	SHA ID121		
Personal Protection & Sanitation	First Aid		
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily		Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention imme (<u>See procedures</u>)	d

	1
NIOSH Respirator Recommendations	
NIOSH/OSHA 0.5 mg/m3: DM^ 1 mg/m3: DMXSQ^/SA 2.5 mg/m3: SA:CF/PAPRDM^ 5 mg/m3: HiEF/SAT:CF/PAPRTHiE/SCBAF/SAF 15 mg/m3: SAF:PD,PP : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE (See symbols and codes)	
Exposure Routes	
Inh Abs Ing Con	1
Symptoms	
Symptoms Nau diarr abdom pain vomity ptocia atrabianus; pari polytic tromory ratetor tight aboat pain, pulm odomay saz, abaraa, psychocia;	_
liver, kidney damage; alopecia; pares legs (See abbreviations)	
Target Organs	
Eyes, resp sys, CNS, liver, kidneys, GI tract, body hair (See abbreviations)	
DOT Emergency Response Guidebook (ERG 2004)	
Guide Number: 151	
151 Substances - Toxic (Non-Combustible) POTENTIAL HAZARDS	
 HEALTH * Highly toxic, may be fatal if inhaled, swallowed or absorbed through skin. 	
* Avoid any skin contact.	
 Effects of contact or inhalation may be delayed. Fire may produce irritating, corrosive and/or toxic cases. 	
 Runoff from fire control or dilution water may be corrosive and/or toxic and cause pollution. 	
FIRE OR EXPLOSION	
 Non-combustible, substance itself does not burn but may decompose upon heating to produce corrosive and/or toxic fumes. Containers may explode when heated. 	
* Runoff may pollute waterways.	
PUBLIC SAFETY * CALL Emergency Response Telephone Number on Shipping Paper first. If	
Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.	
(80 to 160 feet) in all directions.	
 Keep unauthorized personnel away. Stay unwind 	
* Keep out of low areas.	
PROTECTIVE CLOTHING	
 Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by 	
the manufacturer. It may provide little or no thermal protection.	
* Structural firefighters' protective clothing provides limited	
protection in fire situations ONLY; it is not effective in spill	
situations.	
Spill	
 See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under PLIBUC SAFETY 	
Fire	
 If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial avaguation for 800 meters (1/2 mile) in all directions; 	
EMERGENCY RESPONSE FIRE	
Small Fires	
* Dry chemical, CO2 or water spray.	
* Water spray, fog or regular foam.	
 Move containers from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the 	
material. * Use water spray or fog: do not use straight streams	
Fire involving Tanks or Car/Trailer Loads * Fight fire from maximum distance or use unmanned hose holders or	
monitor nozzles. * Do not get water inside containers. * Contract with floading questifier of which will be the floading questifier of which will be the floading questifier of which will be the floading question of the fl	
Cool containers with flooding quantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting cafety	
devices or discoloration of tank. * ALWAYS stay away from tanks engulfed in fire.	
* For massive fire, use unmanned hose holders or monitor nozzles; if this	

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	is impossible, withdraw from area and let fire burn.
	L OR LEAK
-1-	Do not couch gamaged containers or spined material unless wearing
*	Stop lask if you can do it without rick
*	Subject in you can do it without risk.
*	Cover with plactic speet to prevent spreading
*	Abort out plaste site of prevent spreading.
	Absolution of Cover with a visit of other hor-combusuble material
*	DO NOT GET WATER INSTRE CONTAINERS
FIRS	
*	Move victim to fresh air.
*	Call 911 or emergency medical service.
*	Apply artificial respiration if victim is not breathing.
*	Do not use mouth-to-mouth method if victim ingested or inhaled the
1	substance: induce artificial respiration with the aid of a pocket mask
	equipped with a one-way valve or other proper respiratory medical
	device.
*	Administer oxygen if breathing is difficult.
*	Remove and isolate contaminated clothing and shoes.
*	In case of contact with substance, immediately flush skin or eyes with
	running water for at least 20 minutes.
*	For minor skin contact, avoid spreading material on unaffected skin.
*	Keep victim warm and quiet.
*	Effects of exposure (inhalation, ingestion or skin contact) to
	substance may be delayed.
*	Ensure that medical personnel are aware of the material(s) involved,
	and take precautions to protect themselves.
Add	litional Emergency Response Information (CAMEO Data)
Non	fire Snill Desnonse: NA
Time/	
Fire	
Read (REA	ctivity: CHEMICAL PROFILE: Fluorine acts so vigorously on thallium that it turns the metal incandescent (Mellor 5:421 1946-47). CTIVITY, 1999)
First	Aid: NA
_	
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Change: N.R.

OSHA/EPA Occu	pational	Chemical I	Database	- Full Re	port				Page 1 of
	s est and	20						L 💿 OSHA	Advanced Search
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		OF LABU	18						
Occupation	nal Safety	& Health Adm	ninistration	1		A to Z Index En Espa	iñol Cont	act Us What's	New About OSHA
OSHA Home						🔊 RSS Feeds 🛛 둼 Print 🕯	This Page	😑 🛨 Text Size	📕 E-Mail This Page
OSHA/EPA Occu	pational	Chemical	Databas	e					
Chemical Identific	ation								
Chemical Name: PERCh	HLOROETHYL	ENE							
CAS #: 127-18-4		UN No:	1897		Formula	a: C2Cl4			
Synonyms: Perchlorethy	ylene; Perchlo	proethylene; Perl	<; Tetrachlore	ethylene					
Physical Propertie	c								
Physical Description:	S Colorless liqu	id with a mild d	hloroform-lik	a odor					
BP: 2500F	MW· 165				Rating: 0				
ER7/MI T: ER7: -20E	VP · 14 m	.0 mHa			Ith Rating: 0				
FP: NA	VD: NA			NFPA Rea	ctivity Rating: 0				
Sp. GR : 1.62	IP: 9.32	eV	-	NFPA Sp.	Inst.: NA				
Exposure Limits									
OSHA		NIOSH			Related Inform	ation			
PEL-TWA ppm: 100		REL-TWA p	opm: NA		AIHA Emergency Response Planning Guidelines				
PEL-TWA mg/m3: NA		REL-TWA r	ng/m3: NA		- ERPG-1/ERPG	G-2/ERPG-3:			
PEL-STEL ppm: NA		REL-STEL F	ppm: NA						
PEL-STEL mg/m3: NA		REL-STEL r	mg/m3: NA	IA					
PEL-C ppm: 200		REL-C ppm	n: NA						
PEL-C mg/m3: NA		REL-C mg/	' m3 : NA		Carcinogen Clas	ssifications: IARC-2A, NIO	SH-Ca,		
Skin Notation: No		Skin Notat	ion: No		NIP-R, ILV-A3				
Notes: PEAK = 300 ppn MINUTE INTERVAL DUR: HOURS	n FOR A 5 ING ANY 3	Notes: CAR exposure to	CINOGEN (C LOWEST FEA	A); Reduce ASIBLE 0.4 ppm)					
		IDLH ppm:	150	- FF 7	_				
		IDLH mg/r	m3 : NA		-				
		IDLH Note	s: Ca		_				
NIOSH Pocket Gu	ide to Che	emical Hazaı	rds (Curre	ent throug	h June 2006)	1			
Tetrachloroethyl	ene					CAS: 127-18-4			
Formula: CI2C=CCI2						RTECS: KX3850000			
Synonyms & Trade Nam	es: Perchlore	thylene, Perchlor	oethylene, P	erk, Tetrachloi	rethylene	DOT ID & Guide: 1897 1	60		
Exposure Limits				· · · · · · · · · · · · · · · · · · ·					
NIOSH REL: Ca Minimize Appendix A	e workplace e	xposure concent	rations. See	OSHA PEL : peak in any	TWA 100 ppm C 200 3-hours)) ppm 300 ppm (5-minute n	naximum		
IDLH: Ca [150 ppm]				Conversion:	1 ppm = 6.78 mg/m	3			
Physical Description									
Colorless liquid with a m	ild, chlorofori	m-like odor.							
MW: 165.8	BP	: 250F	FRZ: -2F			Sol: 0.02%	1		

VP: 14 mmHg IP: 9.32 eV RGasD: NA Sp.Gr: 1.62 UEL: NA LEL: NA MEC: NA FI.P: NA Noncombustible Liquid, but decomposes in a fire to hydrogen chloride and phosgene. (See flammable and combustible liquid classes) Incompatibilities & Reactivities Strong oxidizers; chemically-active metals such as lithium, beryllium & barium; caustic soda; sodium hydroxide; potash Measurement Methods NIOSH 1003; OSHA 1001 Personal Protection & Sanitation First Aid Skin: Prevent skin contact Eye: Irr immed Eyes: Prevent eye contact Skin: Soap wash prompt Breath: Resp support Wash skin: When contam Swallow: Medical attention immed Remove: When wet or contam

(See procedures)

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DSHA	/EPA Occupational Chemical Database - Full Report
Provide	: Eyewash, Quick drench
NIOSH	I Respirator Recommendations
NIOSH (<u>See sy</u>	: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE mbols and codes)
Exposu	ure Routes
Inh Abs	s Ing Con
Sympt	oms
Irrit eye (<u>See ab</u>	es, skin, nose, throat, resp sys; nau; flush face, neck; verti, dizz, inco; head, som; skin eryt; liver damage; [carc] obreviations)
Target	Organs
Eyes, si (<u>See ab</u>	kin, resp sys, liver, kidneys, CNS <u>ibreviations</u>)
DOT	Emergency Response Guidebook (ERG 2004)
Guide	Number: 160
160 Ha	alogenated Solvents
POTEN	ITIAL HAZARDS
	H Japare may sauce distinger or suffection
* V	xposure in an enclosed area may be very harmful.
* C	ontact may irritate or burn skin and eyes.
* F	ire may produce irritating and/or toxic gases.
	surior from the control or dilution water may cause pollution.
* S	iome of these materials may burn, but none ignite readily.
* M	lost vapors are heavier than air.
* A * C	ir/vapor mixtures may explode when ignited.
	C SAFFTY
* C	ALL Emergency Response Telephone Number on Shipping Paper first. If
Sł	hipping Paper not available or no answer, refer to appropriate
te * T	elephone number listed on the inside back cover.
··· 19	solate spill or leak area initileulately for at least 25 to 50 meters
* K	(eep unauthorized personnel away.
* S	tay upwind.
* M	Nany gases are heavier than air and will spread along ground and
* CC	ollect in low or confined areas (sewers, basements, tanks).
* V	rentilate closed spaces before entering.
PROTE	COTIVE CLOTHING
* V	Vear positive pressure self-contained breathing apparatus (SCBA).
* S	tructural firefighters' protective clothing will only provide limited
Pr FVACU	
Large S	pill
* Č	Consider initial downwind evacuation for at least 100 meters
(3	330 feet).
Fire * Tf	f tank, rail car or tank truck is involved in a fire. ISOLATE for
80	00 meters (1/2 mile) in all directions; also, consider initial
ev	vacuation for 800 meters (1/2 mile) in all directions.
EMERO	GENCY RESPONSE
FIRE Small F	irec
* D	ny chemical, CO2 or water spray.
Large F	ires
* D	Dry chemical, CO2, alcohol-resistant foam or water spray.
* 1	nove containers from fire area if you can do it without risk.
m m	nice fine control water for later disposal, up not scatter the laterial.
Fire inv	olving Tanks or Car/Trailer Loads
* F	ight fire from maximum distance or use unmanned hose holders or
* m	ionitor nozzles.
fir	ioor containers with noouning quantities of water utitil well after re is out.
* V	Vithdraw immediately in case of rising sound from venting safety
de	evices or discoloration of tank.
* A	LWAYS stay away from tanks engulfed in fire.
SPILL ∗ ⊧	UK LEAK I IMINATE all ignition sources (no smoking, flares, sparks or flames
in	immediate area).
* S	top leak if you can do it without risk.
Small L	iquid Spills
taroo €	ake up with sand, earth or other noncombustible absorbent material.
* D	ike far ahead of liquid spill for later disposal.
* P	revent entry into waterways, sewers, basements or confined areas.

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FIRST AID

- * Move victim to fresh air.
- * Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
- * Administer oxygen if breathing is difficult.
- * Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- * For minor skin contact, avoid spreading material on unaffected skin.
- * Wash skin with soap and water.
- * Keep victim warm and quiet.
- * Ensure that medical personnel are aware of the material(s) involved,
- and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Apply water spray or mist to knock down vapors. Vapor knockdown water is corrosive or toxic and should be diked for containment. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Water spill: If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Remove trapped material with suction hoses. (AAR, 1999)

Firefighting: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Decomposed upon heating and by UV light forming phosgene and HCl; reacts violently with finely dispersed light metals and zinc. (Handling Chemicals Safely 1980 p. 887). It has been determined experimentally that mixtures of finely divided barium metal and a number of halogenated hydrocarbons possess an explosive capability. Specifically, impact sensitivity tests have shown that granular barium in contact with monofluorotrichloro- methane, trichlorotrifluoroethane, carbon tetrachloride, trichloroethylene, or tetrachloroethylene can detonate (ASESB Pot. Incid. 39. 1968; Chem. Eng. News 46(9):38. 1968). Decomposes very slowly in water to form trichloroacetic acid and hydrochloric acid (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Corrosive chemicals will destroy the membranes of the mouth, throat, and esophagus and, in addition, have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. Transport the victim IMMEDIATELY to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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SEARCH A to Z Index | En Español | Contact Us | What's New | About OSHA

All DOL OSHA

Page 1 of 4

Advanced Search

💫 RSS Feeds 🛛 🖨 Print This Page 📃 🛨 Text Size 🛛 🖾 E-Mail This Page

OSHA/EPA Occupational Chemical Database

Chemical Identification

 Chemical Name: STYRENE

 CAS #: 100-42-5
 UN No: 2055
 Formula: C8H8

 Synonyms: Ethenyl benzene; Phenylethylen; Styrene monomer; Styrene monomer inhibited; Styrol; Vinyl benzene

Physical Properties				
Physical Description: Colorless to yellow, oily liquid with a sweet, floral odor.				
BP: 293ºF	MW : 104.2	LEL: 0.9%	NFPA Fire Rating: 3	
FRZ/MLT: FRZ: -23ºF	VP: 5 mmHg	UEL: 6.8%	NFPA Health Rating: 2	
FP: 88ºF	VD: NA		NFPA Reactivity Rating: 2	
Sp. GR: 0.91	IP: 8.40 eV		NFPA Sp. Inst.: NA	

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: 100	REL-TWA ppm: 50	AIHA Emergency Response Planning Guidelines
PEL-TWA mg/m3: NA	REL-TWA mg/m3: 215	- ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: 100	50 ppn/230 ppn/1000 ppm
PEL-STEL mg/m3: NA	REL-STEL mg/m3: 425	
PEL-C ppm: 200	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: IARC-2B, TLV-A4
Skin Notation: No	Skin Notation: No	
Notes: PEAK = 600 ppm FOR A 5 MINUTE INTERVAL DURING ANY 3 HOURS	Notes: NA	
	IDLH ppm: NA	
	IDLH mg/m3: 700	
	IDLH Notes: NA	

NIOSH Pocket Gui	de to Chemical Hazards (C	urrent through June 2006)
Styrene			CAS: 100-42-5
Formula: C6H5CH=CH2			RTECS: WL3675000
Synonyms & Trade Name benzene	es: Ethenyl benzene, Phenylethylene,	Styrene monomer, Styrol, Vinyl	DOT ID & Guide: 2055 128P (inhibited)
Exposure Limits			
NIOSH REL: TWA 50 ppn mg/m3)	n (215 mg/m3) ST 100 ppm (425	OSHA PEL : TWA 100 ppm C 2 peak in any 3 hours)	200 ppm 600 ppm (5-minute maximum
IDLH: 700 ppm		Conversion: 1 ppm = 4.26 mg	j/m3
Physical Description			
Colorless to yellow, oily li	quid with a sweet, floral odor.		
MW: 104.2	BP: 293F	FRZ: -23F	Sol: 0.03%
VP: 5 mmHg	IP: 8.40 eV	RGasD: NA	Sp.Gr: 0.91
Fl.P: 88F	UEL: 6.8%	LEL: 0.9%	MEC: NA
Class IC Flammable Liqui	d (See flammable and combustible lie	quid classes)	
Incompatibilities & Re	activities		
Oxidizers, catalysts for vi heat. Usually contains an	nyl polymers, peroxides, strong acids inhibitor such as tert-butylcatechol.]	s, aluminum chloride [Note: May pol 	ymerize if contaminated or subjected to
Measurement Method	s		
NIOSH 1501, 3800; OSH	A 9, 89		
Personal Protection & Sanitation First Aid			
Skin: Prevent skin contac Eyes: Prevent eye contac Wash skin: When contar	t t	Eye: Irr immed Skin: Water flush Breath: Resp support	

temove: When wet (flamm) Change: N.R.	Swallow: Medical attention immed (<u>See procedures</u>)
IIOSH Respirator Recommendations	I
IIOSH/OSHA 500 ppm: CCROV*/SA* 700 ppm: SA:(scape: GMFOV/SCBAE See symbols and codes)	CF*/CCRFOV/GMFOV/PAPROV*/SCBAF/SAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA
Exposure Routes	
nh Abs Ing Con	
Symptoms	
rrit eyes, nose, resp sys; head, ftg, dizz, conf, mal, o See abbreviations)	drow, weak, unsteady gait; narco; defatting derm; possible liver inj; repro effects
arget Organs	
yes, skin, resp sys, CNS, liver, repro sys See abbreviations)	
OOT Emergency Response Guidebook	(ERG 2004)
Guide Number: 128P	
28 Flammable Liquids (Non-Polar/Water-Imp OTENTIAL HAZARDS IRE OR EXPLOSION HIGHLY FLAMMABLE: Will be easily ignited by Vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flam Most vapors are heavier than air. They will spr	niscible) heat, sparks or flames. sh back. read along ground and
collect in low or confined areas (sewers, basen Vapor explosion hazard indoors, outdoors or in Those substances designated with a P may pol	ients, tanks). i sewers. lymerize explosively when
heated or involved in a fire. Runoff to sewer may create fire or explosion h	iazard.
Containers may explode when heated.	
Many liquids are lighter than water.	
Substance may be transported hot.	
Inhalation or contact with material may irritate	e or burn skin and eyes.
Fire may produce irritating, corrosive and/or to	oxic gases.
Vapors may cause dizziness or suffocation.	cause pollution
PUBLIC SAFETY	cause policitori.
CALL Emergency Response Telephone Number	r on Shipping Paper first. If
Shipping Paper not available or no answer, refe	er to appropriate
Isolate spill or leak area immediately for at lea	st 25 to 50 meters
(80 to 160 feet) in all directions.	
Keep unauthorized personnel away.	
Stay upwind.	
Ventilate closed spaces before entering.	
ROTECTIVE CLOTHING	
Wear positive pressure self-contained breathin Structural firefighters' protective clothing will o protection.	g apparatus (SCBA). Inly provide limited
VACUATION	
arge Spill	act 300 maters
(1000 feet).	
ire If tank, rail car or tank truck is involved in a fir	re, ISOLATE for
evacuation for 800 meters (1/2 mile) in all directions, also, col	ctions.
MERGENCY RESPONSE	
IRE	winte Lice of water correct
AUIJUN: All these products have a very low flash p when fighting fire may be inefficient	onit: Use of Water spray
mall Fires	
Dry chemical, CO2, water spray or regular foar	m.
arge Fires Water spray, fog or regular foam	
Use water spray or fog; do not use straight str	reams.
Move containers from fire area if you can do it	without risk.
ire involving Tanks or Car/Trailer Loads	and here helders an
Fight fire from maximum distance or use unma monitor nozzles	annea nose noiders or
Cool containers with flooding quantities of wat	er until well after
fire is out.	
Withdraw immediately in case of rising sound f	from venting safety
Al WAYS stay away from tanks enculfed in fire	
 monitor nozzles. Cool containers with flooding quantities of wat fire is out. Withdraw immediately in case of rising sound f devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire 	er until well after from venting safety e.

Swallow: Medical attention immed

* For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- * ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- * All equipment used when handling the product must be grounded.
- * Do not touch or walk through spilled material.
- * Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- * A vapor suppressing foam may be used to reduce vapors.
- * Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.
- * Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- ^k Move victim to fresh air.
- * Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- * Wash skin with soap and water.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

The letter **P** following the guide number identifies those materials which present a polymerization hazard under certain conditions. First responders at the scene of a dangerous goods incident should seek additional specific information about any material in question as soon as possible. The information received by contacting the appropriate emergency response agency, the emergency response number on the shipping document, or by consulting the information on or accompanying the shipping document, may be more specific and accurate than this guidebook in providing guidance for the materials involved.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Apply "universal" gelling agent to immobilize spill. Apply approriate foam to diminish vapor and fire hazard. Water spill: Use natural barriers or oil spill control booms to limit spill travel. Use surface active agent (e.g. detergent, soaps, alcohols), if approved by epa. Inject "universal" gelling agent to solidify encircled spill and increase effectiveness of booms. If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may spread fire. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Colorless, oily liquid, moderately toxic, flammable. A storage hazard above 32 deg. C, involved in several industrial explosions caused by violent, exothermic polymerization [Bond, J., Loss Prev. Bull., 1985, (065), p. 25]. Polymerization becomes self-sustaining above 95 deg. C [MCA SD-37, 1971]. Violent polymerization leading to explosion may be initiated by peroxides (e.g., di-tert-butyl peroxide, dibenzoyl peroxide), butyllithium, initiators (e.g., azoisobutyronitrile). Reacts violently on contact with strong acids (sulfuric acid, oleum, chlorosulfonic acid), strong oxidizeres [Lewis, 3rd ed., 1993, p. 1185]. Reacts with oxygen above 40 deg. C to form explosive peroxide [Barnes, C. E. et al., J. Amer. Chem. Soc., 1950, 72, p. 210]. Oxidizes readily in air to form unstable peroxides that may explode spontaneously (Bretherick 1979 p.151-154, 164). Mixing styrene in equal molar portions with any of the following substances in a closed container caused the temperature and pressure to increase: chlorosulfonic acid, oleum, and sulfuric acid (NFPA 1991). (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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	al Safaty &	Health Adm	inistration			A to 7 Index	En Español Con	tact Lic What	's Now About OSHA
Occupational Safety & Health Aufministration						A to Z Thdex	En Espanoi Con		S New About OSHA
OSHA Home						RSS Feeds	🖶 Print This Page	🗖 🛨 Text Size	e 🛛 🖂 E-Mail This Page
	ational C	homical	Datahaa	_					
OSHA/EPA Occup	ational C		Jatabase	9					
Chemical Identificat	tion								
Chemical Name: SILVER	METAL								
CAS #: 7440-22-4		UN No:			Formul	a: Ag			
Synonyms: Silver metal:	Argentum								
Physical Properties								1	
Physical Description: M	etal: White, lu	strous solid.							
BP: 3632ºF	MW : 107.9		LEL: NA	NFPA Fire R	Rating: NA				
FRZ/MLT: MLT: 1761ºF	VP: 0 mmHg	g (approx)	UEL: NA	NFPA Healt	h Rating: NA				
FP: NA	VD: NA			NFPA React	tivity Rating: NA				
Sp. GR: 10.49 (metal)	IP: NA			NFPA Sp. Ir	nst.: NA			j	
r								1	
Exposure Limits									
OSHA		NIOSH			Related Inform	ation		1	
PEL-TWA ppm: NA		REL-TWA p	pm: NA		AIHA Emergeno	y Response Pla	nning Guidelines		
PEL-TWA mg/m3: 0.01		REL-TWA m	ng/m3: 0.01		NA	-27 ERI 0-3.			
PEL-STEL ppm: NA		REL-STEL p	pm: NA		4				
PEL-STEL mg/m3: NA		REL-STEL n	ng/m3: NA		4				
PEL-C ppm: NA		REL-C ppm	: NA		Coroinegen Cla	oifications, NA			
Skin Notation: No		REL-C mg/l	m3: NA		Carcinogen Clas	Sifications: NA			
			UII. NO		-				
Notes. NA		IDI H nnm·	NΔ		4				
		IDI H ma/m	13 : 10		-				
		IDLH Notes	:: NA		-				
								1	
NIOSH Pocket Guid	le to Chem	nical Hazar	ds (Curre	nt through	June 2006)				
Silver (metal dust	and solut	ole compo	unds, as <i>i</i>	Ag)		CAS: 7440-22-4			
Formula: Ag (metal)						RTECS: VW3500	000 (metal)		
Synonyms & Trade Names Silver nitrate (AgNO3) var	:: Silver metal: y depending u	Argentum Syr pon the specifi	nonyms of so ic compound.	luble silver com	npounds such as	DOT ID & Guide	: NA		
Exposure Limits						6			
NIOSH REL: TWA 0.01 mg	ı/m3			OSHA PEL: TV	VA 0.01 mg/m3				
IDLH: 10 mg/m3 (as Ag)				Conversion: N	A				
Physical Description									
Metal: White, lustrous soli	d.			1		1			
MW: 107.9	BP: 3	632F		MLT: 1761F		Sol: Insoluble			
VP: 0 mmHg (approx)	IP: N	A		RGasD: NA		Sp.Gr: 10.49 (metal)			
FI.P: NA Matali Nanaamhuatikla Ca	UEL:	NA		JLEL: NA	and combined	MEC: NA			
Incompatibilitios & Pos		adie in form of	aust or pow	der. (<u>See Hamn</u>		<u>ible liquid classes</u>)		
Acetylene ammonia hydr		bromoazide	chlorine trifli	iorida ethylene	aimine ovalic acid	tartaric acid			
Measurement Methods		, bromoaziue,		ionue, euryiene					
NIOSH 7300, 7301, 9102:	OSHA ID121								
Personal Protection & S	Sanitation			First Aid					
Skin: Prevent skin contact				Eve: Irr immed	d				
Eyes: Prevent eye contact				Skin: Water flu	ush			1	
Wash skin: When contam Remove: When wet or cor	tam (AgNO3)			Breath: Resp s Swallow: Medi	support ical attention imme	d		1	
Change: Daily	((See procedur	r <u>es</u>)			1	
Provide: Eyewash								4	
NIOSH Respirator Reco	mmendatior	าร						4	

 NIOSH/OSHA 0.25 mg/m3: SA:CF/PAPRHiE 0.5 mg/m3: HiEF/SCBAF/SAF 10 mg/m3: SAF:PD,PP : SCBAF:PD,PP/SAF:PD,PP:ASCBA

 Escape: HiEF/SCBAE

 (See symbols and codes)

 Exposure Routes

 Inh Ing Con

 Symptoms

 Blue-gray eyes, nasal septum, throat, skin; irrit, ulceration skin; GI dist

 (See abbreviations)

Target Organs

Nasal septum, skin, eyes (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide: NA

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: SMALL SPILLS AND LEAKAGE: If you spill this chemical, you should dampen the solid spill material with 5% acetic acid, then transfer the dampened material to a suitable container. Use absorbent paper dampened with 5% acetic acid to pick up any remaining material. Your contaminated clothing and the absorbent paper should be sealed in a vapor-tight plastic bag for eventual disposal. Wash all contaminated surfaces with 5% acetic acid followed by washing with a strong soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.STORAGE PRECAUTIONS: You should store this chemical in a freezer and away from all mineral acids and bases. (NTP, 1992)

Firefighting: A fire in your laboratory involving this chemical should be extinguished with a dry chemical, carbon dioxide or halon extinguisher. (NTP, 1992)

Reactivity: CHEMICAL PROFILE: In the presence of carbon, the combination of chlorine trifluoride with aluminum, copper, lead, magnesium, silver, tin, or zinc results in a violent reaction (Mellor 2 Supp. 1 1956). Bromoazide explodes on contact with antimony, arsenic, phosphorus, silver foil or sodium. Acetylene forms an insoluble acetylide with silver (Von Schwartz 1918 p. 142). When silver is treated with nitric acid in the presence of ethyl alcohol, silver fullminate may be formed, which can be detonated. Ethyleneimine forms explosive compounds with siver, hence silver should not be used to fabricate equipment for handling ethyleneimine. Finely divided silver and strong solutions of hydrogen peroxide may explode (Mellor 1:936 1946-47). Silver is incompatible with oxalic acid and tartaric acid (Nav Aer. 09-01-505 1956). (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eves with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: Some heavy metals are VERY TOXIC POISONS, especially if their salts are very soluble in water (e.g., lead, chromium, mercury, bismuth, osmium, and arsenic). IMMEDIATELY call a hospital or poison control center and locate activated charcoal, egg whites, or milk in case the medical advisor recommends administering one of them. Also locate Ipecac syrup or a glass of salt water in case the medical advisor recommends inducing vomiting. Usually, this is NOT RECOMMENDED outside of a physician's care. If advice from a physician is not readily available and the victim is conscious and not convulsing, give the victim a glass of activated charcoal slurry in water or, if this is not available, a glass of milk, or beaten egg whites and IMMEDIATELY transport victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, assure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

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D 1 of 3

JSHA/EPA Occu	ipational C	nemical L	vatabase	- Full Rep	ort				Page 1 of
UNITED STATES DEPARTMENT OF LABOR								OL 💿 OSHA	Advanced Search
Occupatio	nal Safety &	Health Adm	inistration			A to Z Index	En Español Co	ntact Us What's	New About OSH
OSHA Home						RSS Feeds	둼 Print This Page	😑 🕂 Text Size	🔀 E-Mail This Page
OSHA/FPA Occu	upational C	hemical [Database	2					
Chamical Identifie									
Chemical Name: P-XYI	ENE								
CAS #: 106-42-3		UN No:	1307		Formula	a: C8H10			
Synonyms: 1,4-Dimethy	ylbenzene; para-	Xylene; p-Xylo	I						
Physical Propertie	S]	
Physical Description:	Colorless liquid	with an aroma	tic odor. [Not	e: A solid belo	w 56ºF.]			_	
BP: 281ºF	MW: 106.2		LEL: 1.1%	NFPA Fire F	Rating: 3			4	
FRZ/MLT: FRZ: 56ºF	VP: 9 mmHg		UEL: 7.0%	NFPA Healt	tivity Pating: 0			-	
FP: 01°F Sp. GB: 0.86	ID: 8 44 eV			NFPA Reac	nst · NA			-	
5P . CR . 0.00	1.0.110							1	
Exposure Limits								1	
OSHA		NIOSH			Related Informa	ation		1	
PEL-TWA ppm: 100		REL-TWA p	om: 100		AIHA Emergenc	y Response Pla			
PEL-TWA mg/m3: 435	5	REL-TWA m	g/m3 : 435		- ERPG-1/ERPG-2/ERPG-3:				
PEL-STEL ppm: NA		REL-STEL p	pm: 150						
PEL-STEL mg/m3: NA	L.	REL-STEL m	n g/m3 : 655						
PEL-C ppm: NA		REL-C ppm:	NA						
PEL-C mg/m3: NA		REL-C mg/r	n3: NA		Carcinogen Clas	sifications: IAR			
Skin Notation: No		Skin Notati	on: No						
Notes: NA		Notes: NA			_				
		IDLH ppm:	900						
		IDLH mg/m	13: NA						
		IDLH Notes	: NA						
NIOSH Pocket Gu	ide to Chem	ical Hazar	ds (Curre	nt through	June 2006)]	
p-Xylene				5	*	CAS: 106-42-3		1	
Formula: C6H4(CH3)2					RTECS: ZE2625000				
Synonyms & Trade Nam	es: 1,4-Dimethy	benzene; para	-Xylene; p-X	ylol		DOT ID & Guide	e: 1307 130	1	
Exposure Limits						r.			
NIOSH REL: TWA 100 p mg/m3)	pm (435 mg/m3) ST 150 ppm	(655	OSHA PEL : TV	: TWA 100 ppm (435 mg/m3)				
IDLH: 900 ppm				Conversion: 1	ppm = 4.41 mg/m3	3			
Physical Description									
Colorless liquid with an a	aromatic odor. [I	Note: A solid b	elow 56F.]			i			
MW: 106.2	BP: 28	1F		FRZ: 56F		Sol: 0.02%		4	
VP: 9 mmHg	IP: 8.4	l4 eV		RGasD: NA		Sp.Gr: 0.86		4	
FI.P: 81F	I.P: 81F UEL: 7.0% LEL: 1.1%			LEL: 1.1%		MEC: NA		-	
Class IC Flammable Liqu	iid (<u>See flammab</u>	le and combus	stible liquid c	<u>asses</u>)				-	
Strong ovidizers, strong	acids							-	
Measurement Methor	ds							1	
NIOSH 1501. 3800: OSH	A 1002							1	
Personal Protection &	& Sanitation			First Aid				1	
Skin: Prevent skin conta	ct			Eye: Irr immed	1			1	
Eyes: Prevent eye conta	ct			Skin: Soap was	sh prompt				
wash skin: When contai Remove: When wet (flai	m mm)			Breath: Resp s Swallow: Media	support cal attention immed	1			
Change: N.R.				(See procedure	<u>lures</u>)				

NIOSH Respirator Recommendations

NIOSH/OSHA 900 ppm: CCROV*/PAPROV*/SA*/SCBAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE (See symbols and codes)

Exposure Routes

Inh Abs Ing Con **Symptoms**

Irrit eyes, skin, nose, throat; dizz, excitement, drow, inco, staggering gait; corn vacuolization; anor, nau, vomit, abdom pain; derm (See abbreviations)

Target Organs

Eyes, skin, resp sys, CNS, GI tract, blood, liver, kidneys (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 130

130 Flammable Liquids (Non-Polar/Water-Immiscible/Noxious)
POTENTIAL HAZARDS
FIRE OR EXPLOSION
 * HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
 Vapors may form explosive mixtures with air.
* Vapors may travel to source of ignition and flash back.
Most vapors are neavier than air. They will spread along ground and collect in low or confined areas (cowers, bacements, tanks)
Vapor explosion bazard indoors outdoors or in sewers
 Those substances designated with a P may polymerize explosively when
heated or involved in a fire.
* Runoff to sewer may create fire or explosion hazard.
* Containers may explode when heated.
* Many liquids are lighter than water.
HEALTH
 May cause toxic effects if inhaled or absorbed through skin. Inhaletion or contact with material may irritate or burn chin and even
Initialition of contact with material may initiate of burn skin and eyes. Fire will produce irritating, corresive and/or toxic gases
Vapors may cause dizziness or suffocation
* Runoff from fire control or dilution water may cause pollution.
PUBLIC SAFETY
 CALL Emergency Response Telephone Number on Shipping Paper first. If
Shipping Paper not available or no answer, refer to appropriate
telephone number listed on the inside back cover.
Isolate spill or leak area immediately for at least 50 to 100 meters (160 to 220 foot) in all directions
(100 to 550 reet) iii dii ullections. * Keen unauthorized nersonnel away
* Stay unwind.
* Keep out of low areas.
* Ventilate closed spaces before entering.
PROTECTIVE CLOTHING
* Wear positive pressure self-contained breathing apparatus (SCBA).
* Structural firefighters' protective clothing will only provide limited
* Consider initial downwind evacuation for at least 300 meters
(1000 feet).
Fire
* If tank, rail car or tank truck is involved in a fire, ISOLATE for
800 meters (1/2 mile) in all directions; also, consider initial
evacuation for 800 meters (1/2 mile) in all directions.
FIRE
CAUTION: All these products have a very low flash point: Use of water spray
when fighting fire may be inefficient.
Small Fires
* Dry chemical, CO2, water spray or regular foam.
Large Fires
 Water spray, rog or regular roam. Do not use straight streams
 Move containers from fire area if you can do it without risk
Fire involving Tanks or Car/Trailer Loads
* Fight fire from maximum distance or use unmanned hose holders or
monitor nozzles.
 Cool containers with flooding quantities of water until well after
fire is out.
withuraw immediately in case of rising sound from venting safety dovices or disceleration of tank
ucvices of disculutation of talls. Al WAYS stay away from tanks engulfed in fire
* For massive fire, use unmanned hose holders or monitor nozzles; if this
is impossible, withdraw from area and let fire burn.
SPILL OR LEAK
 * ELIMINATE all ignition sources (no smoking, flares, sparks or flames
in immediate area).

 All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Large Spills Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. FIRST AID Move victim to fresh air. Call 911 or emergency medical service. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Fifferts of exposure (inhalation, ingestion or skin contact) to
substance may be delayed.
* Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves
Additional Emergency Response Information (CAMEO Data)
wash all contaminated contining and absorbent paper should be sealed in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with acetone followed by washing with a strong soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.STORAGE PRECAUTIONS: You should store this material in a refrigerator. (NTP, 1992) Firefighting: Fire Extinguishing Agents Not to Be Used: Water may be ineffective.Fire Extinguishing Agents: Foam, dry chemical, or carbon dioxide (USCG, 1990)
Reactivity: STABILITY: Stable under normal laboratory conditions REACTIVITY: May react with oxidizing materials (NTP 1992)
First Aid : EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)
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mm.con Agov



Exposure Limits							
NIOSH REL: TWA 5 ppm (19 [15-minute] [skin]	mg/m3) C 15.6 ppm (60 mg/m3)	OSHA PEL: TWA 5 ppm	OSHA PEL: TWA 5 ppm (19 mg/m3) [skin]				
IDLH: 250 ppm		Conversion: 1 ppm = 3	.85 mg/m3				
Physical Description							
Colorless to light-pink, crysta	alline solid with a sweet, acrid odo	r. [Note: Phenol liquefies by	mixing with about 8% water.]				
MW: 94.1	V: 94.1 BP: 359F		Sol(77F): 9%				
VP: 0.4 mmHg	IP: 8.50 eV	RGasD: NA	Sp.Gr: 1.06				
Fl.P: 175F	UEL: 8.6%	LEL: 1.8%	MEC: NA				
Combustible Solid (See flam	mable and combustible liquid class	ses)					
Incompatibilities & React	tivities						
Strong oxidizers, calcium hy	Strong oxidizers, calcium hypochlorite, aluminum chloride, acids						
Measurement Methods							
NIOSH 2546; OSHA 32	NIOSH 2546; OSHA 32						
Personal Protection & Sa	nitation	First Aid	First Aid				
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or conta	m	Eye: Irr immed Skin: Soap wash immer Breath: Resp support Swallow: Medical atten	Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed				

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Thange: Daily	(See procedures)
	_
IIOSH/OSHA 50 nnm: CCROVDM/SA 125 nnm: SA:CE/PAPROV	/DM 250 ppm: CCREOV/HiE/GMEOV/HiE/PAPRTOV/HiE/SCRAE/SAE ·
iCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE See symbols and codes)	
xposure Routes	
nh Abs Ing Con	
Symptoms	
rrit eyes, nose, throat; anor, low-wgt; weak, musc ache, pain; remor, convuls, twitch <u>See abbreviations</u>)	dark urine; cyan; liver, kidney damage; skin burns; derm; ochronosis;
arget Organs	
yes, skin, resp sys, liver, kidneys	
See abbreviations)	
OT Emergency Response Guidebook (ERG 2	2004)
uide Number: 153	
53 Substances - Toxic and/or Corrosive (Combustible)	
'OTENTIAL HAZARDS HEΔI TH	
TOXIC; inhalation, ingestion, or skin contact with materia	al may cause
severe injury or death.	
Contact with molten substance may cause severe burns t	to skin and eyes.
Effects of contact or inhalation may be delayed.	
Fire may produce irritating, corrosive and/or toxic gases.	
Runoff from fire control or dilution water may be corrosiv	ve and/or
Combustible material: may burn but does not ignite read	lily.
When heated, vapors may form explosive mixtures with a	air: indoors,
Outdoors, and sewers explosion hazards.	xplosively when
heated or involved in a fire.	
Contact with metals may evolve flammable hydrogen gas	S.
Containers may explode when heated.	
Substance may be transported in a molten form.	
PUBLIC SAFETY	
CALL Emergency Response Telephone Number on Shippi	ing Paper first. If
telephone number listed on the inside back cover.	priate
Isolate spill or leak area immediately for at least 25 to 50) meters
(80 to 160 feet) in all directions.	
Keep unauthorized personnel away.	
Keep out of low areas.	
Ventilate enclosed areas.	
Wear positive pressure self-contained breathing apparent	us (SCBA)
Wear chemical protective clothing which is specifically re	commended by
the manufacturer. It may provide little or no thermal prot	ection.
Structural Therighters' protective clothing provides limited	
situations.	
VACUATION	
pill See the Table of Initial Isolation and Protoctive Action Di	istances for
highlighted substances. For non-highlighted substances.	increase, in
the downwind direction, as necessary, the isolation distar	nce shown
under PUBLIC SAFETY.	
If tank, rail car or tank truck is involved in a fire. ISOLAT	'E for
800 meters (1/2 mile) in all directions; also, consider initi	al
evacuation for 800 meters (1/2 mile) in all directions.	
IVIERGEINUT RESPONSE	
imall Fires	
Dry chemical, CO2 or water spray.	
arge Fires	4
arge Fires Dry chemical, CO2, alcohol-resistant foam or water spray Move containers from fire area if you can do it without ri-	sk.
arge Fires Dry chemical, CO2, alcohol-resistant foam or water spray Move containers from fire area if you can do it without ri Dike fire control water for later disposal; do not scatter th	isk. he
arge Fires Dry chemical, CO2, alcohol-resistant foam or water spray Move containers from fire area if you can do it without ri. Dike fire control water for later disposal; do not scatter the material.	isk. he
arge Fires Dry chemical, CO2, alcohol-resistant foam or water spray Move containers from fire area if you can do it without ri Dike fire control water for later disposal; do not scatter ti material. ire involving Tanks or Car/Trailer Loads Fight fire from maximum distance or use upmanned bose	e holders or

- * Do not get water inside containers.
- * Cool containers with flooding quantities of water until well after
- fire is out.
- * Withdraw immediately in case of rising sound from venting safety devices or development of table
- devices or discoloration of tank.* ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- * ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- ^k Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- * Stop leak if you can do it without risk.
- ^k Prevent entry into waterways, sewers, basements or confined areas.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- DO NOT GET WATER INSIDE CONTAINERS.

FIRST AID

- * Move victim to fresh air.
- Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
 * Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- * Administer oxygen if breathing is difficult.
- * Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- * For minor skin contact, avoid spreading material on unaffected skin.
- * Keep victim warm and quiet.
- * Effects of exposure (inhalation, ingestion or skin contact) to
- substance may be delayed.
- * Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Neutralize spilled material with crushed limestone, soda ash, or lime. Apply water spray or mist to knock down vapors. Vapor knockdown water is corrosive or toxic and should be diked for containment. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Water spill: If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use "alcohol" foam, dry chemical or carbon dioxide. Keep run-off water out of sewers and water sources. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: A liquid containing over 50% phenol. See Phenol (solid). (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Phenols are very toxic poisons AND corrosive and irritating, so that inducing vomiting may make medical problems worse. IMMEDIATELY call a hospital or poison control center and locate activated charcoal, egg whites, or milk in case the medical advisor recommends administering one of them. If advice from a physician is not readily available and the victim is conscious and not convulsing, give the victim a glass of activated charcoal slurry in water or, if this is not available, a glass of milk, or beaten egg whites and IMMEDIATELY transport victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, assure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

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of 3

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ety & He	ealth Admir	listration			A to Z Index	En Español Cor	ntact Us What's	New About OSHA
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nal Ch	emical D	atabase	9					
ENTL (54%	UN No: 2	315		Formula	a: C6H3Cl2C6H2C	l3 (approx)		
; Polychlor	inated biphen	yl					_	
]	
s to pale-y	ellow, viscous	s liquid or so	olid (below 50°	PF) with a mild, hydi	rocarbon odor.			
: 326 (app	rox) I	LEL: NA	NFPA Fire F	Rating: 1				
0.00006 m	nmHg l	UEL: NA	NFPA Healt	th Rating: 2				
NA			NFPA Reac	tivity Rating: 0				
NA			NFPA Sp. II	nst.: NA]	
							1	
n l	NIOSH			Related Informa	ation		-	
F	REL-TWA pp	m: NA		AIHA Emergenc	y Response Pla	nning Guidelines		
F	REL-TWA ma	/m3 : 0.00	1	- ERPG-1/ERPG	-2/ERPG-3:	g		
	REL-STEL pp	m: NA	-	NA				
	REL-STEL mo	1/m3: NA		1				
	REL-C ppm: 1	NA		1				
F	REL-C ma/m	3: NA		Carcinogen Clas	sifications: IAR	C-2A, NIOSH-Ca,		
	Skin Notatio	n: No		NTP-R, TLV-A3				
r A	Notes: CARCI	NOGEN (Ca THER PCBs), REL ALSO					
i	DLH ppm: N	A		1				
1	DLH mg/m3	B: 5]				
	DLH Notes:	Са					J	
Chemio	cal Hazard	s (Curre	nt through	June 2006)			1	
chlorin	e)			,	CAS: 11097-69-	1	1	
ox)							-	
lor 1254, F	PCB, Polychlor	inated biph	enyl		DOT ID & Guide	: 2315 171	-	
/m3 See A	ppendix A [*N	Note: The	osha pel: TV	VA 0.5 mg/m3 [skin]			
			Conversion: N	A				
							_	
liquid or s	olid (below 50	DF) with a n	nild, hydrocarb	on odor.	r			
BP: 689)-734F		FRZ: 50F		Sol: Insoluble		_	
IP: ?			RGasD: NA		Sp.Gr(77F): 1.3	3	_	
UEL: NA LEL: NA			LEL: NA	t containing PCBs	MEC: NA	ibenzofurans and		
uro in o fir	e results in th	oustible liqu	id classes)	containing rebs,	polychionnateu u	ibenzorurans, and		
ure in a fir See flamma	able and comb							
ure in a fir See flamma ies	able and comb							
ure in a fir See flamma ies	able and comb						-	
ure in a fir See flamma ies	able and comb						-	
ure in a fir See flamma ies	able and comb						-	
ure in a fir See flamma ies	able and comb		First Aid					
ure in a fir Gee flamma ies	able and comb		First Aid Eye: Irr imme	d			- - - -	
ure in a fir see flamma ies	able and comb		First Aid Eye: Irr immer Skin: Soap wa	d ish immed			-	
ure in a fir Gee flamma ies	able and comb		First Aid Eye: Irr immed Skin: Soap wa Breath: Resp s Swallow: Medi	d ish immed support ical attention immed	1		-	
	ety & He ety & He nal Ch ENYL (549 Polychlor 326 (app 0.00006 m NA VA VA Indication Indication Chemic Chlorin ox) Ior 1254, I Image: Note of the second sec	nal Chemical D ENYL (54% CHLORINE) UN No: 2 Polychlorinated biphen s to pale-yellow, viscous 326 (approx) D.00006 mmHg NA VA NIOSH REL-TWA ppl REL-TWA ppl REL-STEL pp REL-STEL pp REL-STEL pp REL-STEL mg REL-C ppm: I REL-C mg/m Skin Notation Notes: CARCI APPLIES TO O IDLH ppm: N IDLH mg/m3 IDLH Notes: Chemical Hazard chlorine) ox) Ior 1254, PCB, Polychlor /m3 See Appendix A [*N II] Iiquid or solid (below 50 BP: 689-734F	ety & Health Administration nal Chemical Database ENYL (54% CHLORINE) UN No: 2315 Polychlorinated biphenyl s to pale-yellow, viscous liquid or se 326 (approx) LEL: NA 0.00006 mmHg UEL: NA 0.00006 mmHg NA 0.00000 mmHg UEL: NA 0.00000 mmHg NA 0.00000 mmHg NA 0.00000 mmHg NA 0.00000 mmHg NA 0.00000 0.00000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.000 0.0000 0.000 0.0000	ety & Health Administration nal Chemical Database ENYL (54% CHLORINE) UN No: 2315 Polychlorinated biphenyl s to pale-yellow, viscous liquid or solid (below 506 326 (approx) LEL: NA NFPA Fire I 0.00006 mmHg UEL: NA NFPA Healt NA NFPA Reac VA NFPA Sp. I NIOSH REL-TWA ppm: NA REL-TWA mg/m3: 0.001 REL-STEL ppm: NA REL-STEL ppm: NA REL-C ppm: NA REL-C ppm: NA REL-C mg/m3: NA REL-C mg/m3: NA Skin Notation: No Notes: CARCINOGEN (Ca), REL ALSO APPLIES TO OTHER PCBs IDLH ppm: NA IDLH mg/m3: 5 IDLH Notes: Ca Chemical Hazards (Current through chlorine) ox) lor 1254, PCB, Polychlorinated biphenyl //m3 See Appendix A [*Note: The OSHA PEL: TV Conversion: N liquid or solid (below 50F) with a mild, hydrocarb BP: 689-734F FRZ: 50F	ety & Health Administration anal Chemical Database ENYL (54% CHLORINE) UN No: 2315 Polychlorinated biphenyl s to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydr 326 (approx) LEL: NA NFPA Fire Rating: 1 0.0006 mmHg UEL: NA NFPA Reactivity Rating: 0 NFPA Sp. Inst.: NA NIOSH REL-TWA mg/m3: 0.001 REL-STEL ppm: NA REL-STEL ppm: NA REL-C mg/m3: S IDLH Notes: Ca	ety & Health Administration A to Z Index ety & Health Administration	ety & Health Administration A to Z Index En Español Cor	ety & Health Administration A to 2 Index En Español Contact Us What's N KSS Feeds Print This Page Print This Page Tot Size Print This Page Print This Page Tot Size Print This Page Print This Page Tot Size Print This Page Print This Page Print

Provide: Eyewash, Quick drench	
NIOSH Respirator Recommendations	
NIOSH : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE	
(See symbols and codes)	
Exposure Routes	
Inh Abs Ing Con	
Symptoms	
Irrit eyes, chloracne; liver damage; repro effects; [carc]	
(See abbreviations)	
Target Organs	
Skin, eyes, liver, repro sys	
(See abbreviations)	
DOT Emergency Response Guidebook (ERG 2004)	
Guide Number: 171	
171 Substances (Low to Moderate Hazard)	
POTENTIAL HAZARDS	
FIRE UR EXPLOSION * Some may hurn but none ignite readily	
 Those substances designated with a P may polymerize explosively when 	
heated or involved in a fire.	
* Containers may explode when heated.	
* Some may be transported hot.	
Inhalation of material may be harmful.	
* Contact may cause burns to skin and eyes.	
 Inhalation of Asbestos dust may have a damaging effect on the lungs. 	
* Fire may produce irritating, corrosive and/or toxic gases.	
* Runoff from fire control may cause pollution.	
* CALL Emergency Response Telephone Number on Shipping Paper first. If	
Shipping Paper not available or no answer, refer to appropriate	
telephone number listed on the inside back cover.	
Isolate spill or leak area immediately for at least 10 to 25 meters	
(30 to 80 feet) in all difections. * Keen unauthorized nerconnel away	
* Stay upwind.	
PROTECTIVE CLOTHING	
* Wear positive pressure self-contained breathing apparatus (SCBA).	
 Structural firefighters' protective clothing will only provide limited protection 	
EVACUATION	
Fire	
* If tank, rail car or tank truck is involved in a fire, ISOLATE for	
800 meters (1/2 mile) in all directions; also, consider initial	
EMERGENCY RESPONSE	
FIRE	
Small Fires	
* Dry chemical, CO2, water spray or regular foam.	
Large Files * Water spray, fog or regular foam	
* Move containers from fire area if you can do it without risk.	
* Do not scatter spilled material with high pressure water streams.	
* Dike fire-control water for later disposal.	
Hire involving Tanks * Cool containers with flooding quantities of water until well after	
fire is out.	
* Withdraw immediately in case of rising sound from venting safety	
devices or discoloration of tank.	
ALWAYS stay away from tanks engulfed in fire.	
* Do not touch or walk through spilled material.	
* Stop leak if you can do it without risk.	
* Prevent dust cloud.	
Avoid inhalation of asbestos dust.	
 With clean shovel place material into clean. drv container and cover 	
loosely; move containers from spill area.	
Small Spills	
* Take up with sand or other noncombustible absorbent material and place	
Into containers for later disposal.	
Large Spins * Dike far ahead of liquid spill for later disposal	
* Cover powder spill with plastic sheet or tarp to minimize spreading.	
* Prevent entry into waterways, sewers, basements or confined areas.	
FIRSTAID	
j^* Prove victim to tresh air.	

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=731

- * Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
- * Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
 In case of contact with substance, immediately flush skin or eyes with
- running water for at least 20 minutes.
- * Ensure that medical personnel are aware of the material(s) involved,
- and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Apply water spray or mist to knock down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Water spill: Use natural barriers or oil spill control booms to limit spill travel. Remove trapped material with suction hoses. (AAR, 1999)

Firefighting: Use foam, dry chemical, or carbon dioxide. Keep run-off water out of sewers and water sources. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. (AAR, 1999)

Reactivity: This compound is incompatible with the following: Strong oxidizers (NIOSH, 1997)

First Aid: Eye: If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. Skin: If this chemical contacts the skin, immediately wash the contaminated skin with soap and water. If this chemical penetrates the clothing immediately remove the clothing and wash the skin with soap and water. Get medical attention promptly. Breathing: If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible. Swallow: If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1997)

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UNITED STATES DEPARTMENT OF LABOR Occupational Safety & Health Administration

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All DOL OSHA

OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: CHLORODIPHENYL (42% CHLORINE)CAS #: 53469-21-9UN No: 2315Synonyms: Aroclor®1242; PCB; Polychlorinated biphenyl

Formula: C6H4ClC6H3Cl2 (approx)

Physical Properties							
Physical Description: Colorless to light-colored, viscous liquid with a mild, hydrocarbon odor.							
BP : 617-691ºF	: 617-691°F MW: 258 (approx) LEL: NA NFPA Fire Rating: 1						
FRZ/MLT: FRZ: -2°F	RZ/MLT: FRZ: -2°F VP: 0.001 mmHg UEL: NA NFPA Health Rating: 2						
FP: NA	NFPA Reactivity Rating: 0						
Sp. GR : (77ºF): 1.39	IP: NA		NFPA Sp. Inst.: NA				

Exposure Limits				
OSHA	NIOSH	Related Information		
EL-TWA ppm: NA REL-TWA ppm: NA		AIHA Emergency Response Planning Guidelines		
PEL-TWA mg/m3: 1	REL-TWA mg/m3: 0.001	- ERPG-1/ERPG-2/ERPG-3:		
PEL-STEL ppm: NA	REL-STEL ppm: NA			
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA			
PEL-C ppm: NA	REL-C ppm: NA			
PEL-C mg/m3: NA REL-C mg/m3: NA		Carcinogen Classifications: IARC-2A, NIOSH-Ca,		
Skin Notation: Yes	Skin Notation: No	NTP-R		
Notes: NA	Notes: CARCINOGEN (Ca); TWA applies to other PCBs			
	IDLH ppm: NA			
	IDLH mg/m3: 5			
	IDLH Notes: Ca			

NIOSH Pocket Guide to Chemical Hazards (Current through June 2006)									
Chlorodiphenyl (42% cl	CAS: 53469-21-9								
Formula: C6H4ClC6H3Cl2 (approx))		RTECS: TQ1356000						
Synonyms & Trade Names: Aroclo	r 1242, PCB, Polychlorinated biph	nenyl	DOT ID & Guide: 2315 171						
Exposure Limits									
NIOSH REL*: Ca TWA 0.001 mg/n REL also applies to other PCBs.]	n3 See Appendix A [*Note: The	OSHA PEL: TWA 1 mg/m3 [skin]							
IDLH: Ca [5 mg/m3]		Conversion: NA							
Physical Description									
Colorless to light-colored, viscous liquid with a mild, hydrocarbon odor.									
MW: 258 (approx)	BP: 617-691F	FRZ: -2F	Sol: Insoluble						
VP: 0.001 mmHg	IP: ?	RGasD: NA	Sp.Gr(77F): 1.39						
FI.P: NA	UEL: NA	LEL: NA	MEC: NA						
Nonflammable Liquid, but exposur chlorinated dibenzo-p-dioxins. (See	e in a fire results in the formation <u>e flammable and combustible liqu</u>	n of a black soot containing PCBs, <u>uid classes</u>)	polychlorinated dibenzofurans &						
Incompatibilities & Reactivitie	es								
Strong oxidizers									
Measurement Methods									
NIOSH 5503; OSHA PV2089									
Personal Protection & Sanitati	ion	First Aid							
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: Daily		Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed (<u>See procedures</u>)							

Advanced Search
Provide: Eyewash, Quick drench
NIOSH Respirator Recommendations
NIOSH : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOVHiE/SCBAE See symbols and codes)
Exposure Routes
nh Abs Ing Con
Symptoms
rrit evec chlorache: liver damage: renzo effecto: [carc]
See abbreviations)
Farget Organs
Skin, eyes, liver, repro sys
DOT Emergency Response Guidebook (ERG 2004)
Guide Number: 171
I71 Substances (Low to Moderate Hazard) POTENTIAL HAZARDS FIRE OR EXPLOSION * Some may burn but none ignite readily. * Those substances designated with a P may polymerize explosively when
heated or involved in a fire. Containers may explode when heated. Some may be transported hot. HEALTH
 Inhalation of material may be harmful. Contact may cause burns to skin and eyes. Inhalation of Asbestos dust may have a damaging effect on the lungs. Fire may produce irritating, corrosive and/or toxic gases. Runoff from fire control may cause pollution.
CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 10 to 25 meters (30 to 80 feet) in all directions.
 Keep unauthorized personnel away. Stay upwind. PROTECTIVE CLOTHING Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited
EVACUATION
Fire
800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions. EMERGENCY RESPONSE
FIRE Small Fires
^c Dry chemical, CO2, water spray or regular foam. Large Fires
Water spray, fog or regular foam.
Move containers from fire area if you can do it without risk. Do not scatter spilled material with high pressure water streams.
ire involving control water for later disposal. Fire involving Tanks
fire is out. Withdraw immediately in case of rising sound from venting safety
devices or discoloration of tank.
SPILL OR LEAK
 Do not touch or walk through spilled material. Stop leak if you can do it without risk.
Avoid inhalation of asbestos dust.
With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.
Small Spills Take up with sand or other noncombustible absorbent material and place
arge Spills
 Cover powder spill with plastic sheet or tarp to minimize spreading. Prevent entry into waterways, sewers, basements or confined areas.
FIRST AID Move victim to fresh air.

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=730

- * Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
- * Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
 In case of contact with substance, immediately flush skin or eyes with
- running water for at least 20 minutes.
- * Ensure that medical personnel are aware of the material(s) involved,
- and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Apply water spray or mist to knock down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Water spill: Use natural barriers or oil spill control booms to limit spill travel. Remove trapped material with suction hoses. (AAR, 1999)

Firefighting: Use foam, dry chemical, or carbon dioxide. Keep run-off water out of sewers and water sources. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. (AAR, 1999)

Reactivity: This compound is incompatible with the following: Strong oxidizers (NIOSH, 1997)

First Aid: Eye: If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. Skin: If this chemical contacts the skin, immediately wash the contaminated skin with soap and water. If this chemical penetrates the clothing immediately remove the clothing and wash the skin with soap and water. Get medical attention promptly. Breathing: If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible. Swallow: If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1997)

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Page 1 of 3

	cupational C		andouse	I an Rop					ruge ro
	er states	2						OOL 💿 OSHA	Advanced Search
	DIMENTA	2 Ne larma	3						SEARCH
	tional Cafaty &	//F ⊫Al®⊘T Heelth Admi	N			0 to 7 loods.			
Occupa	lional Salety &	nealth Aumi	nistration			A to Z Index	En Español Co	ntact Us what's	New About OSHA
OSHA Home						RSS Feeds	🖶 Print This Page	🗖 🚹 Text Size	🖂 E-Mail This Page
	evenetional C								
JSHA/EPA UC	cupational C		atabase	9					
Chemical Identi	fication								
Chemical Name: 0-2	XYLENE								
CAS #: 95-47-6		UN No: 1	L307		Formul	a: C8H10			
Synonyms: 1,2-Dime	ethylbenzene; ortho	-Xylene; o-Xylo	bl						
								-	
Physical Proper	ties							_	
Physical Descriptio	on: Colorless liquid	with an aromati	ic odor.					4	
BP: 2929F	MW: 106.2		LEL: 0.9%	NFPA Fire F	Rating: 3			-	
FRZ/MLT: FRZ: -134]	UEL: 6.7%	NEPA Healt	tivity Pating: 0			4	
Sp. GR: 0.88	IP: 8 56 eV			NFPA Reac	nst · NA			-	
3p : GR : 0.00	11.0.50 CV			NITA Sp. 1	130.104			4	
Exposure Limite	_							7	
	>	MIOSU			Deleted Inform	ation		-	
DSHA	1		m. 100					-	
PEL-TWA ppm. 100	435	REL-TWA pp	n/m3·435		- ERPG-1/ERPG	-2/ERPG-3:	inining Guidennes		
PFL-STFL ppm: NA	155	REL-TWA IN	L ppm: 150		NA				
PEL-STEL ma/m3:	NA	REL-STEL m	a/m3 : 655		1				
PEL-C ppm: NA		REL-C ppm:	NA						
PEL-C mg/m3: NA		REL-C mg/m	13: NA		Carcinogen Cla	1			
Skin Notation: No		Skin Notatio	n: No		1				
Notes: NA		Notes: NA]				
		IDLH ppm: 9	900]				
		IDLH mg/m	3: NA		_				
		IDLH Notes:	NA						
								-	
NIOSH Pocket (Guide to Chem	nical Hazaro	ls (Curre	nt through	June 2006)				
o-Xylene						CAS: 95-47-6			
Formula: C6H4(CH3)2	2					RTECS: ZE2450	000	1	
Synonyms & Trade N	ames: 1,2-Dimethy	lbenzene; ortho	o-Xylene; o-X	Kylol		DOT ID & Guide	e: 1307 130		
Exposure Limits									
NIOSH REL: TWA 100	0 ppm (435 mg/m3) ST 150 ppm (655	OSHA PEL : TV	NA 100 ppm (435 r	ng/m3)			
IDLH: 900 ppm				Conversion: 1 ppm = 4.34 ma/m3				1	
Physical Descriptio	on				FF - 5/	-		1	
Colorless liquid with a	an aromatic odor.							1	
MW: 106.2	BP: 29	92F		FRZ: -13F		Sol: 0.02%		1	
VP: 7 mmHg	IP: 8.	56 eV		RGasD: NA		Sp.Gr: 0.88]	
Fl.P: 90F	UEL: 6	UEL: 6.7%			LEL: 0.9% MEC: NA				
Class IC Flammable L	iquid (<u>See flammat</u>	ble and combus	tible liquid c	lasses)					
Incompatibilities &	Reactivities							4	
Strong oxidizers, stro	ng acids							4	
Measurement Meth	nods							4	
NIOSH 1501, 3800; C	DSHA 1002							4	
Personal Protection	n & Sanitation			First Aid				4	
SKIN: Prevent SKIN COI Eyes: Prevent eve coi	ntact			Eye: Irr Immed Skin: Soap was	u sh prompt			1	
Wash skin: When con	ntam			Breath: Resp s	support	d		1	
Kemove: when wet (Change: N.R.	namm)			Swallow: Media (See procedure	cal attention imme es)	u			
								1	

NIOSH Respirator Recommendations

NIOSH/OSHA 900 ppm: CCROV*/PAPROV*/SA*/SCBAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE (See symbols and codes)

Exposure Routes

Inh Abs Ing Con **Symptoms**

Irrit eyes, skin, nose, throat; dizz, excitement, drow, inco, staggering gait; corn vacuolization; anor, nau, vomit, abdom pain; derm (See abbreviations)

Target Organs

Eyes, skin, resp sys, CNS, GI tract, blood, liver, kidneys (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 130

	130 Flammable Liquids (Non-Polar/Water-Immiscible/Noxious)
	POTENTIAL HAZARDS
	FIRE OR EXPLOSION
	 * HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
	* Vapors may form explosive mixtures with air.
	 Vapors may travel to source of ignition and flash back. Mast uppers are beauting then air. They will arread along ground and
	 Most vapors are neavier than air. They will spread along ground and collect in low or confined areas (cowers, basements, tanks).
	Vanor evolosion bazard indoors outdoors or in sewers
	 Those substances designated with a P may polymerize explosively when
	heated or involved in a fire.
	 Runoff to sewer may create fire or explosion hazard.
	* Containers may explode when heated.
	* Many liquids are lighter than water.
	HEALTH * May cauce toxic offects if inhaled or absorbed through skin
	 Inhalation or contact with material may irritate or burn skin and eves
	 Fire will produce irritating, corrosive and/or toxic gases.
	* Vapors may cause dizziness or suffocation.
	 Runoff from fire control or dilution water may cause pollution.
	PUBLIC SAFETY
	* CALL Emergency Response Telephone Number on Shipping Paper first. If
	shipping Paper not available or no answer, refer to appropriate
	 Isolate snill or leak area immediately for at least 50 to 100 meters
	(160 to 330 feet) in all directions.
	* Keep unauthorized personnel away.
	* Stay upwind.
	* Keep out of low areas.
	* Ventilate closed spaces before entering.
	* Wear positive pressure self-contained breathing apparatus (SCRA)
	* Structural firefighters' protective clothing will only provide limited
	protection.
	EVACUATION
	Large Spill
	* Consider initial downwind evacuation for at least 300 meters
	(1000 Teel). Fire
	* If tank rail car or tank truck is involved in a fire ISOI ATE for
	800 meters (1/2 mile) in all directions; also, consider initial
	evacuation for 800 meters (1/2 mile) in all directions.
	EMERGENCY RESPONSE
	FIRE
	CAUTION: All these products have a very low flash point: Use of water spray
	Small Fires
	* Dry chemical, CO2, water spray or regular foam.
	Large Fires
	* Water spray, fog or regular foam.
	* Do not use straight streams.
	* Move containers from fire area if you can do it without risk.
	Fire involving Tanks or Car/Trailer Loads *
	monitor nozzles.
	* Cool containers with flooding guantities of water until well after
	fire is out.
	 Withdraw immediately in case of rising sound from venting safety
	devices or discoloration of tank.
	* ALWAYS stay away from tanks engulfed in fire.
	For massive fire, use unmanned nose noiders or monitor nozzles; if this is impossible, withdraw from area and let fire hump
	וש ווויףטשטוטר, אונווערמא ווטווו מוכמ מווע וכנ וווכ טעווו. SPILL OR LEAK
	 * ELIMINATE all ignition sources (no smoking, flares, sparks or flames
	in immediate area).
18	

le su se	1
* All equipment used when handling the product must be grounded.	
Stop leak if you can do it without risk.	
* Prevent entry into waterways, sewers, basements or confined areas.	
* A vapor suppressing foam may be used to reduce vapors.	
* Absorb or cover with dry earth, sand or other non-combustible material	
and transfer to containers.	
* Use clean non-sparking tools to collect absorbed material.	
Large Spills	
 Dike far ahead of liquid spill for later disposal. When any many spik had not bed many and request insisting in closed. 	
* Water spray may reduce vapor; but may not prevent ignition in closed	
spaces.	
* Move victim to fresh air.	
* Call 911 or emergency medical service.	
* Apply artificial respiration if victim is not breathing.	
* Administer oxygen if breathing is difficult.	
* Remove and isolate contaminated clothing and shoes.	
* In case of contact with substance, immediately flush skin or eyes with	
running water for at least 20 minutes.	
* Wash skin with soap and water.	
* Keep victim warm and quiet.	
* Effects of exposure (inhalation, ingestion or skin contact) to	
substance may be delayed.	
 Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves 	
	-
Additional Emergency Response Information (CAMEO Data)	
wash all contaminated surfaces with acetone followed by washing with a strong soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.STORAGE PRECAUTIONS: You should store this material in a refrigerator. (NTP, 1992)	
Firefighting: Fire Extinguishing Agents Not to Be Used: Water may be ineffective. Fire Extinguishing Agents: Foam, dry chemical, or carbon dioxide (USCG, 1999)	
Reactivity: STABILITY: This chemical is stable under normal laboratory conditions.REACTIVITY: This compound may react with oxidizing materials. (NTP, 1992)	9
First Aid : EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DC NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the victim is convulsing by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)	
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Page 1 of 3

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() DEPART	əlaicə Mento	, Flaraf	2						SEARCH
Occupationa	al Safety & F	lealth Admi	nistration			A to Z Index	En Español Coi	ntact Us What'	s New About OSH
OSHA Home	,					RSS Feeds	Print This Page	E E Tevt Size	E-Mail This Page
OSHA Home						M K35 Teeus			
OSHA/EPA Occup	ational C	hemical D	atabase	e					
Chemical Identificat	ion								
Chemical Name: NICKEL	METAL								
CAS #: 7440-02-0		UN No: 2	2881		Formula	a: Ni			
Synonyms: Nickel metal: E	Elemental nick	el; Nickel catal	yst						
Physical Properties								٦	
Physical Description: Me	etal: Lustrous,	silvery, odorle	ss solid.					-	
BP: 5139ºF	MW: 58.7		LEL: NA	NFPA Fire I	Rating: 3				
FRZ/MLT: FRZ: NA	VP: NA		UEL: 2831ºF	NFPA Healt	th Rating: 2				
FP: NA	VD: NA			NFPA Reac	tivity Rating: 3			1	
Sp. GR: 8.90 (Metal)	IP: NA			NFPA Sp. I	nst.: NA				
								7	
Exposure Limits		1						1	
OSHA		NIOSH			Related Informa	ation		4	
PEL-TWA ppm: NA		REL-TWA pp	om: NA		AIHA Emergenc	y Response Pla -2/FRPG-3:	nning Guidelines		
PEL-TWA mg/m3: 1		REL-TWA m	mg/m3: 0.015		NA	-27 ERI 0-3.			
PEL-STEL ppm: NA		REL-STEL pp	pm: NA		-				
PEL-STEL mg/m3: NA REL-STEL m		ig/m3: NA		-					
PEL-C ppm: NA		REL-C ppm:	NA					-	
PEL-C mg/m3: NA		REL-C mg/n	13: NA	Carcinogen Classifications: IARC-2B, NIOSH-Ca NTP-R, TLV-A5			C-2B, NIOSH-Ca,		
Skin Notation: No		Skin Notatio	n: NO						
NOTES: NA		Notes: CARC	s: CARCINOGEN (Ca)		-				
			2. 10		-				
			3 . 10		-				
			Cu		1			1	
NIOSH Pocket Guid	e to Chem	ical Hazaro	ls (Curre	nt through	June 2006)			1	
Nickel metal and o	ther com	ounds (as	s Ni)			CAS: 7440-02-0		1	
Formula: Ni (Metal)						RTECS: OR595(000 (Metal)	-	
Synonyms & Trade Names:	: Nickel metal:	Elemental nicl	kel, Nickel ca	atalyst Synonyr	ns of other nickel	DOT ID & Guide	:: NA	1	
compounds vary depending	g upon the spe	ecific compound	d. ′						
Exposure Limits				r				1	
NIOSH REL*: Ca TWA 0.01	15 mg/m3 See	Appendix A [*	Note: The	OSHA PEL* :	TWA 1 mg/m3 [*No	ote: The PEL doe	s not apply to		
IDLH: Ca [10 mg/m3 (as N					μ.] ΙΔ			-	
Physical Description								-	
Metal: Lustrous, silvery, od	lorless solid.							1	
MW: 58.7	BP: 51	.39F		MLT: 2831F		Sol: Insoluble		1	
VP: 0 mmHg (approx)	IP: NA	١		RGasD: NA		Sp.Gr: 8.90 (Me	tal)	1	
FI.P: NA	UEL: N	NA		LEL: NA		MEC: NA		1	
Metal: Combustible Solid: nickel sponge catalyst may ignite SPC		nite SPONTA	ANEOUSLY in a	ir. (See flammable	and combustible	liquid classes)	1		
Metal: Combustible Solid; r	nickel sponge o	, , , ,						-1	
Incompatibilities & Rea	nickel sponge o ctivities								
Metal: Combustible Solid; r Incompatibilities & Rea Strong acids, sulfur, seleniu	nickel sponge o ctivities um, wood & ot	ther combustib	les, nickel ni	itrate					
Metal: Combustible Solid; r Incompatibilities & Rea Strong acids, sulfur, seleniu Measurement Methods	nickel sponge o ctivities um, wood & ot	ther combustib	les, nickel ni	itrate				-	
Metal: Compustible Solid; r Incompatibilities & Rea Strong acids, sulfur, selenin Measurement Methods NIOSH 7300, 7301, 7303, 9	nickel sponge o ictivities um, wood & ot 9102; OSHA II	ther combustib	les, nickel ni	itrate					
Metal: Compustible Solid; r Incompatibilities & Rea Strong acids, sulfur, seleniu Measurement Methods NIOSH 7300, 7301, 7303, 9 Personal Protection & S	nickel sponge (ctivities um, wood & ot 9102; OSHA II sanitation	ther combustib	les, nickel ni	itrate First Aid					
Metal: Compustible Solid; r Incompatibilities & Rea Strong acids, sulfur, seleniu Measurement Methods NIOSH 7300, 7301, 7303, 9 Personal Protection & S Skin: Prevent skin contact	nickel sponge o ctivities um, wood & ot 9102; OSHA II canitation	ther combustib	les, nickel ni	First Aid	uch immed			-	
Metal: Compustible Solid; r Incompatibilities & Rea Strong acids, sulfur, selenit Measurement Methods NIOSH 7300, 7301, 7303, 9 Personal Protection & S Skin: Prevent skin contact Eyes: N.R. Wash skin: When contam/I	nickel sponge o ctivities um, wood & ot 9102; OSHA II canitation Daily	ther combustib	les, nickel ni	First Aid Skin: Water fl Breath: Resp	ush immed support				
Metal: Compustible Solid; r Incompatibilities & Rea Strong acids, sulfur, seleniu Measurement Methods NIOSH 7300, 7301, 7303, 9 Personal Protection & S Skin: Prevent skin contact Eyes: N.R. Wash skin: When contam/I Remove: When wet or contam/I	nickel sponge o ctivities um, wood & ot 9102; OSHA II canitation Daily tam	D121, ID125G	les, nickel ni	First Aid Skin: Water fl Breath: Resp Swallow: Med	ush immed support ical attention imme	d			

NIOSH Respirator Recommendations
NIOSH : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE
(See symbols and codes)
Exposure Routes
Inh Ing Con
Symptoms
Sens derm, allergic asthma, pneuitis; [carc] (<u>See abbreviations</u>)
Target Organs
Nasal cavities, lungs, skin
(<u>see appreviations</u>)
DOT Emergency Response Guidebook (ERG 2004)
Guide Number: 135
135 Substances - Spontaneously Combustible
POTENTIAL HAZARDS
FIRE OR EXPLOSION
May ignite on contact with moist air or moisture
* May burn rapidly with flare-burning effect.
* Some react vigorously or explosively on contact with water.
 Some may decompose explosively when heated or involved in a fire. May regional after fire is extinguished.
Kay re-ignite after fire is excludioned. Runoff may create fire or explosion hazard.
HEALTH
* Fire will produce irritating, corrosive and/or toxic gases.
 Inhalation of decomposition products may cause severe injury or death. Contact with substance may cause severe huma to skin and ever
Contact with substance may cause severe burns to skin and eyes. Runoff from fire control may cause pollution.
PUBLIC SAFETY
* CALL Emergency Response Telephone Number on Shipping Paper first. If
Shipping Paper not available or no answer, refer to appropriate
Isolate snill or leak area immediately for at least 100 to 150 meters
(330 to 490 feet) in all directions.
* Stay upwind.
 Keep unauthorized personnel away. Keep aut of low areas
PROTECTIVE CLOTHING
* Wear positive pressure self-contained breathing apparatus (SCBA).
* Wear chemical protective clothing which is specifically recommended by
the manufacturer. It may provide little or no thermal protection.
protection.
EVACUATION
Spill
* See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase in
the downwind direction, as necessary, the isolation distance shown
under PUBLIC SAFETY.
Fire
800 meters (1/2 mile) in all directions: also, consider initial
evacuation for 800 meters (1/2 mile) in all directions.
EMERGENCY RESPONSE
FIRE
Some of these materials may react violently with water.
EXCEPTION: For Dithionite (Hydrosulfite/Hydrosulphite) UN1384, UN1923 and
UN1929, USE FLOODING AMOUNTS OF WATER for SMALL AND LARGE fires to
stop the reaction. Smothering will not work for these materials.
Small Fires
* Dry chemical, soda ash, lime or DRY sand, EXCEPT for UN1384, UN1923 and
UN1929.
Large Fires * DRY sand dry chemical soda ash or lime EYCEPT for LIN1384 LIN1023 and
UN1929, or withdraw from area and let fire burn.
* Move containers from fire area if you can do it without risk.
Fire involving Tanks or Car/Trailer Loads
 right fire from maximum distance or use unmanned hose holders or monitor nozzles
* Do not get water inside containers or in contact with substance.
* Cool containers with flooding quantities of water until well after
fire is out.
withuraw infinediately in case of rising sound from venting safety

devices or discoloration of tank.

Fully encapsulating, vapor protective clothing should be worn for

ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

spills and leaks with no fire. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch or walk through spilled material. Stop leak if you can do it without risk. Small Spills EXCEPTION: For Dithionite (Hydrosulfite/Hydrosulphite) spills, UN1384, UN1923 and UN1929, dissolve with 5 parts water and collect for proper disposal. Cover with DRY earth, DRY sand, or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Use clean non-sparking tools to collect material and place it into loosley covered plastic containers for later disposal. Prevent entry into waterways, sewers, basements or confined areas. FIRST AID Move victim to fresh air. Call 911 or emergency medical service. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Keep material dry. (AAR, 1999) Firefighting: Flood with water. Use dry chemical, graphite, or dry earth. (AAR, 1999) Reactivity: AIR AND WATER REACTIONS: Pyrophoric, Ignites spontaneously in the presence of air; during storage, H2 escapes with fire and explosion hazards; reacts violently with acids forming H2. (Handling Chemicals Safely 1980. p. 807). (REACTIVITY, 1999) First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: Some heavy metals are VERY TOXIC POISONS, especially if their salts are very soluble in water (e.g., lead, chromium, mercury, bismuth, osmium, and arsenic). IMMEDIATELY call a hospital or poison control center and locate activated charcoal, egg whites, or milk in case the medical advisor recommends administering one of them. Also locate Ipecac syrup or a glass of salt water in case the medical advisor recommends inducing vomiting. Usually, this is NOT RECOMMENDED outside of a physician's care. If advice from a physician is not readily available and the victim is conscious and not convulsing, give the victim a glass of activated charcoal slurry in water or, if this is not available, a glass of milk, or beaten egg whites and IMMEDIATELY transport victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, assure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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Page 1 of 3

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Occupationa	al Safety & H	lealth Adm	inistration			A to Z Index	En Español Co	ntact Us What's	New About OSHA
OSHA Home	OSHA Home					RSS Feeds	둼 Print This Page	🗖 🕂 Text Size	🐱 E-Mail This Page
OSHA/EPA Occup	ational C	hemical [Databas	е					
Chemical Identificat	tion								
Chemical Name: NAPHTH									
CAS #: 91-20-3		UN No:	1334		Formula	a: C10H8			
Synonyms: Naphthalin; T	ar camphor; W	hite tar	1551		i ormaic				
Physical Properties								1	
Physical Description: (olorless to brov	vn solid with a	n odor of m	othballs [Note:	Shinned as a molto	an solid 1		-	
BD· 4240F	MW· 128 2				Pating · 2			-	
FR7/MIT · MIT· 1760F	VP: 0.08 mm	Ha	LIFL · 5.9%		th Rating: 2			1	
FP: 174°F		ing	GEE : 5.570	NFPA React	tivity Rating: 0			1	
Sp. GR: 1.15	IP: 8 12 eV			NFPA Sp. Jr	nst · NA				
Sp. OK. 1 .15	11 : 0.12 CV				15t. IV				
Exposure Limits								1	
OSHA		NIOSH			Related Informa	ation			
PEL-TWA ppm: 10		REL-TWA p	om: 10		AIHA Emergenc	v Response Pla	nning Guidelines		
PEL-TWA mg/m3: 50		REL-TWA m	a/m3: 50		- ERPG-1/ERPG	-2/ERPG-3:	5		
PEL-STEL ppm: NA		REL-STEL p	pm: 15		NA				
PEL-STEL mg/m3: NA		RFL-STFL m	na/m3: 75						
PEL-C ppm: NA		REL-C ppm:	: NA						
PEL-C mg/m3: NA		REL-C ma/r	m3: NA	Carcinogen Classifications: TLV-A4			1		
Skin Notation: No		Skin Notati	on: No						
Notes: NA		Notes: NA			-				
		IDLH ppm:	250						
		IDLH ma/m	13: NA		-				
		IDLH Notes	: NA		1				
E		r.						-	
NIOSH Pocket Guid	le to Chem	ical Hazar	ds (Curre	ent through	June 2006)				
Naphthalene						CAS: 91-20-3			
Formula: C10H8						RTECS: QJ05250	000	1	
Synonyms & Trade Names	: Naphthalin, T	ar camphor, \	White tar			DOT ID & Guide or refined) 2304	: 1334 133 (crude 133 (molten)		
Exposure Limits						,	. /		
NIOSH REL: TWA 10 ppm	(50 mg/m3) S	T 15 ppm (75	mg/m3)	OSHA PEL : TV	VA 10 ppm (50 mg/	/m3)			
IDLH: 250 ppm				Conversion: 1	ppm = 5.24 mg/m3	3		1	
Physical Description								4	
Colorless to brown solid w	ith an odor of r	nothballs. [No	te: Shipped	as a molten sol	lid.]	<u>i</u>		4	
MW: 128.2	BP: 42	4F		MLT: 176F		Sol: 0.003%		4	
VP: 0.08 mmHg	IP: 8.1	2 eV		RGasD: NA		Sp.Gr: 1.15		4	
Fl.P: 174F	UEL: 5	.9%		LEL: 0.9%		MEC: NA		4	
Combustible Solid, but will	take some effe	ort to ignite. (See flammat	ole and combus	tible liquid classes)			4	
Incompatibilities & Rea	activities							4	
Strong oxidizers, chromic a	anhydride							4	
Measurement Methods								4	
NIOSH 1501; OSHA 35				r					
Personal Protection & S	Sanitation			First Aid				-	
Skin: Prevent skin contact				Eye: Irr immed) ush immed/col.lic.c	oan wash promo			
Wash skin: When contam				Breath: Resp s	support				
Remove: When wet or con	ntam			Swallow: Medie	cal attention immed	1			
Change: Daily				(See procedure	<u>es</u>)				

NIOSH Respirator Recommendations

OSHA/EPA Occupational Chemical Database - Full Report

 NIOSH/OSHA 100 ppm: CCROVDM*/SA* 250 ppm: SA:CF*/CCRFOVHiE/PAPROVDM*/SCBAF/SAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA

 Escape: GMFOVHIE/SCBAE

 (See symbols and codes)

 Exposure Routes

 Inh Abs Ing Con

 Symptoms

 Irrit eyes; head, conf, excitement, mal; nau, vomit, abdom pain; irrit bladder; profuse sweat; jaun; hema, hemog, renal shutdown; derm, optical neuritis, corn damage

 (See abbreviations)

 Target Organs

 Eyes, skin, blood, liver, kidneys, CNS

 (See abbreviations)

 DOT Emergency Response Guidebook (ERG 2004)

 Guide Number: 133

133 Flammable Solids POTENTIAL HAZARDS FIRE OR EXPLOSION

- * Flammable/combustible material.
- * May be ignited by friction, heat, sparks or flames.
- Some may burn rapidly with flare burning effect.
 Powders, dusts, shavings, borings, turnings or cuttings may explode or
- burn with explosive violence.Substance may be transported in a molten form.
- * May re-ignite after fire is extinguished.

HEALTH

- * Fire may produce irritating and/or toxic gases.
- * Contact may cause burns to skin and eyes.
- * Contact with molten substance may cause severe burns to skin and eyes.
- * Runoff from fire control may cause pollution.

PUBLIC SAFETY

- * CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- * Isolate spill or leak area immediately for at least 10 to 25 meters (30 to 80 feet) in all directions.
- Keep unauthorized personnel away.
- * Stay upwind.

* Keep out of low areas.

PROTECTIVE CLOTHING

Wear positive pressure self-contained breathing apparatus (SCBA).
 Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

 Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

* If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE Small Fires

* Dry chemical, CO2, sand, earth, water spray or regular foam. Large Fires

- * Water spray, fog or regular foam.
- * Move containers from fire area if you can do it without risk.
- Fire involving Tanks or Car/Trailer Loads
- * Cool containers with flooding quantities of water until well after fire is out.
- * For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- * ALWAYS stay away from tanks engulfed in fire.
- SPILL OR LEAK
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- * Do not touch or walk through spilled material.

Small Dry Spills

- With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.
- Large Spills * Wet down with water and dike for later disposal.
- Prevent entry into waterways, sewers, basements or confined areas.

FIRST AID

Move victim to fresh air.

 Call 911 or emergency medical service. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Removal of solidified molten material from skin requires medical assistance. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.
Additional Emergency Response Information (CAMEO Data)
Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999)
Firefighting : Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Solid streams of water may be ineffective. Use "alcohol" foam, dry chemical or carbon dioxide. (AAR, 1999)
Reactivity: CHEMICAL PROFILE: Naphthalene, camphor, glycerol, or turpentine will react violently with chromic anhydride (Haz. Chem. Data 1967. p 68). (REACTIVITY, 1999)
First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuere entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital probenical into the victim's lungs. However, if the victim is conscious and not convulsing and if medical help is not readily available, consider the risk of inducing vomiting because of the high toxicity of the chemical ingested. Ipecac syrup or salt water may be used in such an emergency. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

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05

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of 3

OSHA/EPA Occup	pational Cl	hemical D	Database	- Full Rep	ort				Page 1 of
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	al Safety & I	Tr I⊑R I®Ø Health Adm	inistration			A to 7 Indox	En Español Co	ntaat Us What's	
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OSHA Home						RSS Feeds	둼 Print This Page	😑 🕂 Text Size	🐱 E-Mail This Page
OSHA/EPA Occup	pational C	hemical I	Database	e					
Chamical Idantifica	tion								
Chemical Name: M-XYL									
CAS #: 108-38-3		UN No:	1307		Formula	a: C8H10			
Synonyms: 1,3-Dimethyl	benzene; meta	-Xylene; m-Xy	lol						
Physical Properties	5							1	
Physical Description: (Colorless liquid v	vith an aroma	tic odor.					1	
BP: 282ºF	MW: 106.2		LEL: 1.1%	NFPA Fire F	Rating: 3				
FRZ/MLT: FRZ: -54ºF	VP: 9 mmHg		UEL: 7.0%	NFPA Healt	h Rating: 2				
FP: 82ºF	VD: NA		-	NFPA React	tivity Rating: 0			4	
Sp. GR : 0.86	IP: 8.56 eV			NFPA Sp. Ir	nst.: NA				
Exposure Limits								1	
OSHA		NIOSH			Related Informa	ation		1	
PEL-TWA ppm: 100		REL-TWA p	pm: 100		AIHA Emergenc	y Response Pla	Inning Guidelines	1	
PEL-TWA mg/m3: 435		REL-TWA m	mg/m3 : 435		- ERPG-1/ERPG-2/ERPG-3:				
PEL-STEL ppm: NA REL-STEL p		L ppm : 150							
PEL-STEL mg/m3: NA		REL-STEL m	ng/m3: 655						
PEL-C ppm: NA		REL-C ppm	: NA						
PEL-C mg/m3: NA		REL-C mg/ı	m3: NA	Carcinogen Classifications: IARC-3,			C-3, TLV-A4	1	
Skin Notation: No		Skin Notati	on: No						
Notes: NA		Notes: NA							
		IDLH ppm:	ppm: 900						
		IDLH mg/m IDLH Notes	n3: NA :: NA		-				
								-	
NIOSH Pocket Gui	de to Chem	ical Hazar	ds (Curre	nt through	June 2006)	1		4	
m-Xylene						CAS: 108-38-3		1	
Formula: C6H4(CH3)2				RTECS: ZE2275000			000	4	
Synonyms & Trade Name	s: 1,3-Dimethyl	benzene; met	a-Xylene; m-	Xylol		DOT ID & Guide	e: 1307 130	4	
NIOSH REL: TWA 100 pp	m (435 mg/m3)	ST 150 ppm	(655	OSHA PEL : TV	VA 100 ppm (435 n	ng/m3)		-	
IDLH: 900 ppm				Conversion: 1	ppm = 4.34 ma/m3	3		-	
Physical Description			I		pp	-		1	
Colorless liquid with an ar	romatic odor.							1	
MW: 106.2	BP: 28	2F		FRZ: -54F		Sol: Slight		1	
VP: 9 mmHg	IP: 8.5	6 eV		RGasD: NA		Sp.Gr: 0.86		1	
Fl.P: 82F	UEL: 7	.0%		LEL: 1.1%	MEC: NA			1	
Class IC Flammable Liquid	d (<u>See flammab</u>	le and combu	stible liquid c	lasses)				1	
Incompatibilities & Re	activities								
Strong oxidizers, strong a	cids								
Measurement Methods	5								
NIOSH 1501, 3800; OSHA	A 1002		-					4	
Personal Protection &	Sanitation			First Aid				4	
Skin: Prevent skin contact	t t			Eye: Irr immed	j sh prompt			1	
Wash skin: When contam	L .			Breath: Resp s	support			1	
Remove: When wet (flam	ım)			Swallow: Medie	cal attention immed	ł		1	
Change: N.K.				(See procedures)					

NIOSH Respirator Recommendations

NIOSH/OSHA 900 ppm: CCROV*/PAPROV*/SA*/SCBAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE (See symbols and codes)

Exposure Routes

Inh Abs Ing Con **Symptoms**

Irrit eyes, skin, nose, throat; dizz, excitement, drow, inco, staggering gait; corn vacuolization; anor, nau, vomit, abdom pain; derm

(<u>See abbreviations</u>) Target Organs

Eyes, skin, resp sys, CNS, GI tract, blood, liver, kidneys (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 130

	130 Flammable Liquids (Non-Polar/Water-Immiscible/Noxious)
	POTENTIAL HAZARDS
	FIRE OR EXPLOSION
	 HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
	* Vapors may form explosive mixtures with air.
	* Vapors may travel to source of ignition and flash back.
	 Most vapors are neavier than air. They will spread along ground and collect in low or confined areas (cowers, basements, tanks).
	Vapor explosion bazard indoors outdoors or in sewers
	 Those substances designated with a P may polymerize explosively when
	heated or involved in a fire.
	* Runoff to sewer may create fire or explosion hazard.
	* Containers may explode when heated.
	* Many liquids are lighter than water.
	HEALTH
	 May cause toxic effects if inhaled or absorbed through skin. Inhaletion or contract with material maximizate or hum align and even
	 Initialition of contact with material may initiate of burn skin and eyes. Fire will produce irritating, corrective and/or taxic gases.
	Vapors may cause dizziness or sufficiation
	* Runoff from fire control or dilution water may cause pollution.
	PUBLIC SAFETY
	 CALL Emergency Response Telephone Number on Shipping Paper first. If
	Shipping Paper not available or no answer, refer to appropriate
	telephone number listed on the inside back cover.
	* Isolate spill or leak area immediately for at least 50 to 100 meters
	(160 to 330 feet) in all directions.
	* Stay unwind
	* Keep out of low areas.
	* Ventilate closed spaces before entering.
	PROTECTIVE CLOTHING
	 Wear positive pressure self-contained breathing apparatus (SCBA).
	 Structural firefighters' protective clothing will only provide limited
H.	protection.
	Large Spill * Consider initial downwind evacuation for at least 300 meters
	(1000 feet).
	Fire
	* If tank, rail car or tank truck is involved in a fire, ISOLATE for
	800 meters (1/2 mile) in all directions; also, consider initial
II.	evacuation for 800 meters (1/2 mile) in all directions.
Ш	EMERGENCY RESPONSE
	FIRE CALITION: All these products have a very low flash point: Lise of water sprav
Ш	when fighting fire may be inefficient.
	Small Fires
	* Dry chemical, CO2, water spray or regular foam.
	Large Fires
	* Water spray, fog or regular foam.
	* Do not use straight streams.
	* Move containers from fire area if you can do it without risk.
	Fife Involving Tanks of Carl Iralier Lodus
	monitor nozzles.
	* Cool containers with flooding quantities of water until well after
	fire is out.
1	 Withdraw immediately in case of rising sound from venting safety
	devices or discoloration of tank.
	* ALWAYS stay away from tanks engulfed in fire.
	* For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible with draw form and let fine here.
	Is impossible, withdraw from area and let fire burn.
	SFILL UR LEAN * El IMINATE all ignition sources (no smoking flares, sparks or flames
	in immediate area).
11	in infinediace dreap.

All equipment used when handling the product must be grounded.	
Do not touch or walk through spilled material. Stop leak if you can do it without risk	
Prevent entry into waterways, sewers, basements or confined areas.	
A vapor suppressing foam may be used to reduce vapors.	
Absorb or cover with dry earth, sand or other non-combustible material	
and transfer to containers.	
arge Spills	
Dike far ahead of liquid spill for later disposal.	
Water spray may reduce vapor; but may not prevent ignition in closed	
spaces.	
Move victim to fresh air	
Call 911 or emergency medical service.	
Apply artificial respiration if victim is not breathing.	
Administer oxygen if breathing is difficult.	
Remove and isolate contaminated clothing and shoes.	
running water for at least 20 minutes.	
Wash skin with soap and water.	
Keep victim warm and quiet.	
Effects of exposure (inhalation, ingestion or skin contact) to	
substance may be delayed.	
and take precautions to protect themselves.	
Additional Emergency Response Information (CAMEO Data)	
ontaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.STORAGE RECAUTIONS: You should store this material in a refrigerator away from oxidizers. STORE AWAY FROM SOURCES OF IGNITION. (NTP, 992) irefighting: Fire Extinguishing Agents Not to Be Used: Water may be ineffective.Fire Extinguishing Agents: Foam, dry chemical, or	
arbon dioxide (USCG, 1999)	
eactivity: STABILITY: This chemical is stable under normal laboratory conditions.REACTIVITY: This compound may react with oxidizing naterials. (NTP, 1992)	
irst Aid : EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution or 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the ictim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no ymptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all ontaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation evelop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY ave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of Breathing, or urning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper espiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) hould be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO IOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and MMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the ictim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her ide with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)	
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Page 1 of 3

UNITED ST/ DEPARTME	ATES NT OF LABC	rR					DL 🖲 OSHA	Advanced Search
Occupational Saf	ety & Health Adn	ninistration			A to Z Index	En Español Con	tact Us What's N	lew About OSHA
OSHA Home					RSS Feeds	🖶 Print This Page	🗕 🛨 Text Size	🐱 E-Mail This Page
OSHA/EPA Occupatio	nal Chemical	Database	•					
Chemical Identification								
Chemical Name: METHYLENE (
CAS #: 75-09-2	UN No:	1593		Formula	: CH2Cl2			
Synonyms: Dichloromethane; M	lethylene dichloride							
Physical Properties								
Physical Description: Colorless	s liquid with a chlorof	orm-like odor.	[Note: A gas a	above 104°F.1				
BP: 104°F MW:	: 84.9	LEL: 13%	NFPA Fire F	Rating: 1				
FRZ/MLT: FRZ: -139°F VP: 3	350 mmHg	UEL: 23%	NFPA Healt	h Rating: 2				
FP: NA VD:	NA		NFPA Reac	tivity Rating: 0				
Sp. GR: 1.33 IP: 1	11.32 eV		NFPA Sp. II	nst.: NA				
Evenesure Limite								
				Polatod Inform	tion			
DEL_TWA_ppm: 25		nm: NA			v Posnonso Pla	nning Guidelines		
PEL-TWA ppin: 25	REL-TWA P	na/m3·NA		- ERPG-1/ERPG	-2/ERPG-3:	uning Guidennes		
PEL-STEL nnm: 125	REL-TWAT			NA				
PEL-STEL ppnn: 125	REL-STEL	na/m3·NA						
PEL-C ppm: NA	REL-STEET	: NA		1				
PEL-C ma/m3: NA	REL-C ma/	m3: NA		Carcinogen Clas	sifications: IAR	C-2B. NIOSH-Ca.		
Skin Notation: Yes	Skin Notat	ion: Yes	NTP-R, OSHA-Ca, TLV-A3			- ,,		
Notes: SEE 29 CFR 1910.1052	Notes: CAR exposure to	CINOGEN (Ca LOWEST FEAS); Reduce SIBLE					
		2300		-				
	IDLH ma/r	n3: NA		1				
	IDLH Note	s: Ca						
	a	1 (0		1 2000				
NIOSH POCKET Guide to	Chemical Hazai	ras (Currei	nt through	June 2006)	CAC: 75 00 0			
Methylene chloride			CAS: 75-09-2					
Formula: CH2Cl2			RTECS: PA8050000			000		
Synonyms & Trade Names: Dichl	loromethane, Methyle	ne dichloride			DOT ID & Guide	: 1593 160		
NIOSH DELL Co Soo Appondix A				10 10521 TWA 25	nm CT 12E nnm			
IDI H: Ca [2300 ppm]			Conversion: 1	10.1032 $100A 23$				
Physical Description				ppm = 5.17 mg/m				
Colorless liquid with a chloroform	n-like odor. [Note: A d	as above 104	F.]					
MW: 84.9	BP: 104F		 FRZ: -139F		Sol: 2%			
VP: 350 mmHg	IP: 11.32 eV		RGasD: NA		Sp.Gr: 1.33			
Fl.P: ?	UEL: 23%	ĺ	LEL: 13%		MEC: NA			
Combustible Liquid (See flammal	ble and combustible li	quid classes)			•			
Incompatibilities & Reactivit	ies							
Strong oxidizers; caustics; chemi acid	ically-active metals su	ch as aluminu	m, magnesium	ı powders, potassiu	m & sodium; con	centrated nitric		
Measurement Methods								
NIOSH 1005, 3800; OSHA 59, 80)							
Personal Protection & Sanita	tion		First Aid					
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R.	Eye: Irr immed Skin: Soap was Breath: Resp s Swallow: Medi (See procedure	h prompt upport cal attention immed	1					

Provide: Eyewash, Quick drench
(See symbols and codes)
Exposure Routes
Inh Abs Ing Con
Symptoms
Irrit eyes, skin; ftg, weak, som, li-head; numb, tingle limbs; nau; [carc]
(See abbreviations)
Target Organs
(See abbreviations)
DOT Emergency Response Guidebook (ERG 2004)
Guide Number: 160
160 Halogenated Solvents
HEALTH
 Vapors may cause dizziness or suffocation. Every in an endocod area may be very barmful
* Contact may irritate or burn skin and eyes.
 Fire may produce irritating and/or toxic gases. Buseff from fire control or dilution water may cause collution.
FIRE OR EXPLOSION
* Some of these materials may burn, but none ignite readily.
 Most vapors are neavier than air. Air/vapor mixtures may explode when ignited.
* Container may explode in heat of fire.
PUBLIC SAFETY CALL Fmergency Response Telephone Number on Shipping Paper first. If
Shipping Paper not available or no answer, refer to appropriate
telephone number listed on the inside back cover. * Isolate spill or leak area immediately for at least 25 to 50 meters
(80 to 160 feet) in all directions.
 Keep unauthorized personnel away. Stay unwind
* Many gases are heavier than air and will spread along ground and
collect in low or confined areas (sewers, basements, tanks).
 Keep out of low areas. * Ventilate closed spaces before entering.
PROTECTIVE CLOTHING
 Wear positive pressure sen-contained breathing apparatus (SCDA). Structural firefighters' protective clothing will only provide limited
protection.
EVACUATION Large Spill
* Consider initial downwind evacuation for at least 100 meters
(330 feet). Fire
* If tank, rail car or tank truck is involved in a fire, ISOLATE for
800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.
EMERGENCY RESPONSE
FIRE Small Fires
* Dry chemical, CO2 or water spray.
Large Fires *Dry_chemical_CO2_alcohol-resistant foam or water spray
* Move containers from fire area if you can do it without risk.
* Dike fire control water for later disposal; do not scatter the
Fire involving Tanks or Car/Trailer Loads
* Fight fire from maximum distance or use unmanned hose holders or
* Cool containers with flooding quantities of water until well after
fire is out.
Withdraw immediately in case or rising sound from venting safety devices or discoloration of tank.
* ALWAYS stay away from tanks engulfed in fire.
SPILL OR LEAK ELIMINATE all ignition sources (no smoking, flares, sparks or flames
in immediate area).
* Stop leak if you can do it without risk.
* Take up with sand, earth or other noncombustible absorbent material.
Large Spills
 Dike far anead of liquid spill for later disposal. Prevent entry into waterways sewers basements or confined areas

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=445

FIRST AID

- * Move victim to fresh air.
- * Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
- * Administer oxygen if breathing is difficult.
- * Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- * For minor skin contact, avoid spreading material on unaffected skin.
- * Wash skin with soap and water.
- * Keep victim warm and quiet.
- * Ensure that medical personnel are aware of the material(s) involved,
- and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. Remove trapped material with suction hoses. (AAR, 1999)

Firefighting: Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Keep run-off water out of sewers and water sources. (AAR, 1999)

Reactivity: STABILITY: This chemical is sensitive to heat. It is also sensitive to exposure to moisture. It is subject to slow hydrolysis which is accelerated by light. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions.REACTIVITY: This chemical reacts vigorously with active metals such as lithium, sodium and potassium, and with strong bases such as potassium tert-butoxide. It is incompatible with strong oxidizers, strong caustics and chemically active metals such as aluminum or magnesium powders. The liquid will attack some forms of plastic, rubber and coatings. This compound reacts with sodium-potassium alloy, (potassium hydrogen + N-methyl-N-nitrosurea), nitrogen tetroxide and liquid oxygen. It also reacts with titanium. On contact with water it corrodes iron, some stainless steels, copper and nickel. It is incompatible with amines, zinc and alloys of aluminum, magnesium and zinc. This compound is liable to explode when mixed with dinitrogen pentoxide or nitric acid. Mixtures of this compound in air with methanol vapor are flammable. (NTP, 1992)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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OSHA/EPA Occupational Chemical Database

Chemical Identification

OSHA Home

Chemical Name: METHYL ISOBUTYL KETONE

UNITED STATES

Formula: C6H12O CAS #: 108-10-1 **UN No:** 1245

Synonyms: Isobutyl methyl ketone; Methyl isobutyl ketone; 4-Methyl 2-pentanone; MIBK

Physical Properties						
Physical Description: Co	olorless liquid with a plea	asant odor.				
BP: 242°F MW: 100.2 LEL: (200°F): 1.2% NFPA Fire Rating: 3						
FRZ/MLT: FRZ: -120ºF	VP : 16 mmHg	UEL: (200ºF) 8.0%	NFPA Health Rating: 2			
P: 64°F VD: NA NFPA Reactivity Rating: 0						
Sp. GR: 0.80	IP: 9.30 eV		NFPA Sp. Inst.: NA			

Exposure Limits			
OSHA	NIOSH	Related Information	
PEL-TWA ppm: 100	REL-TWA ppm: 50	AIHA Emergency Response Planning Guidelines	
PEL-TWA mg/m3: 410	REL-TWA mg/m3: 205	- ERPG-1/ERPG-2/ERPG-3:	
PEL-STEL ppm: NA	REL-STEL ppm: 75		
PEL-STEL mg/m3: NA	REL-STEL mg/m3: 300		
PEL-C ppm: NA	REL-C ppm: NA		
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: NA	
Skin Notation: No	Skin Notation: No		
Notes: NA	Notes: NA		
	IDLH ppm: 500		
	IDLH mg/m3: NA		
	IDLH Notes: NA		

NIOSH Pocket Guide t	o Chemical Hazards (Curre	ent through June 2006)		
Hexone		CAS: 108-10-1		
Formula: CH3COCH2CH(CH3)2	2		RTECS: SA9275000	
Synonyms & Trade Names: Iso MIBK	obutyl methyl ketone, Methyl isobuty	l ketone, 4-Methyl 2-pentanone,	DOT ID & Guide: 1245 127	
Exposure Limits				
NIOSH REL: TWA 50 ppm (205	5 mg/m3) ST 75 ppm (300 mg/m3)	OSHA PEL : TWA 100 ppm (410	mg/m3)	
IDLH: 500 ppm		Conversion: 1 ppm = 4.10 mg/m	3	
Physical Description				
Colorless liquid with a pleasant	t odor.			
MW: 100.2	BP: 242F	FRZ: -120F	Sol: 2%	
VP: 16 mmHg	VP: 16 mmHg IP: 9.30 eV		Sp.Gr: 0.80	
Fl.P: 64F	UEL(200F): 8.0%	LEL(200F): 1.2%	MEC: NA	
Class IB Flammable Liquid (<u>Se</u>	e flammable and combustible liquid o	classes)		
Incompatibilities & Reactive	vities			
Strong oxidizers, potassium te	rt-butoxide			
Measurement Methods				
NIOSH 1300, 2555; OSHA 100	4			
Personal Protection & Sanitation First Aid				
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam		Eye: Irr immed Skin: Water flush prompt Breath: Resp support		

OSHA/EPA Occupational Chemical Database - Full Report

Remove: When wet (flamm) Change: N.R.	Swallow: Medical attention immed (<u>See procedures</u>)
NIOSH Respirator Recommendations	
NIOSH/OSHA 500 ppm: CCROV*/GMFOV/PAPRTOV*/SA*/SCBAF (See symbols and codes)	: SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE
Exposure Routes	
Inh Ing Con	
Symptoms	
Irrit eyes, skin, muc memb; head, narco, coma; derm; in animal (<u>See abbreviations</u>)	s: liver, kidney damage
Target Organs	
Eyes, skin, resp sys, CNS, liver, kidneys (<u>See abbreviations</u>)	
DOT Emergency Response Guidebook (ERG 20	04)
Guide Number: 127	
127 Flammable Liquids (Polar/Water-Miscible) POTENTIAL HAZARDS FIRE OR EXPLOSION	
 HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks 	s or flames.
 vapors may form explosive mixtures with air. Vapors may travel to source of ignition and flash back 	
* Most vapors are heavier than air. They will spread along g	round and
collect in low or confined areas (sewers, basements, tanks)).
* Those substances designated with a P may polymerize exp	plosively when
heated or involved in a fire.	
 Runoff to sewer may create fire or explosion hazard. Containers may explode when heated 	
* Many liquids are lighter than water.	
HEALTH	
 Inhalation or contact with material may irritate or burn ski Fire may produce irritating corrosive and/or toxic gases 	n and eyes.
* Vapors may cause dizziness or suffocation.	
* Runoff from fire control may cause pollution.	
* CALL Emergency Response Telephone Number on Shippin Shipping Paper not available or no answer, refer to approp	g Paper first. If riate
 * Isolate spill or leak area immediately for at least 25 to 50 (80 to 160 feet) in all directions. 	meters
 Keep unauthorized personnel away. Stay, unwind 	
* Keep out of low areas.	
* Ventilate closed spaces before entering.	
* Wear positive pressure self-contained breathing apparatus	; (SCBA).
* Structural firefighters' protective clothing will only provide	limited
protection.	
Large Spill	
* Consider initial downwind evacuation for at least 300 meters	ers
Fire	
* If tank, rail car or tank truck is involved in a fire, ISOLATE	for
800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions	
EMERGENCY RESPONSE	
when fighting fire may be inefficient.	water spray
* Dry chemical, CO2, water spray or alcohol-resistant foam.	
 Large Fires Water spray, fog or alcohol-resistant foam. 	
* Use water spray or fog; do not use straight streams.	
Move containers from fire area if you can do it without risk	κ.
* Fight fire from maximum distance or use unmanned hose	holders or
monitor nozzles.	
Cool containers with flooding quantities of water until well fire is out	after
 Withdraw immediately in case of rising sound from venting 	a safety
devices or discoloration of tank.	- ·
 ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanded base holders or masiber of 	norralee, if this
is impossible, withdraw from area and let fire burn.	
http://www.osha.gov/web/dep/chemicaldata/	ChemicalResult.asp?RecNo=103

SPILL OR LEAK

- * ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- * All equipment used when handling the product must be grounded.
- * Do not touch or walk through spilled material.
- * Stop leak if you can do it without risk.
- * Prevent entry into waterways, sewers, basements or confined areas.
- * A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- * Use clean non-sparking tools to collect absorbed material.

Large Spills

- * Dike far ahead of liquid spill for later disposal.
- * Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- * Move victim to fresh air.
- * Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- * Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
 In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- running water for at least 20 minutes.
- * Wash skin with soap and water.
 * Keen with warm and guidt
- * Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to disperse vapors and dilute standing pools of liquid. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use "alcohol" foam, dry chemical or carbon dioxide. (AAR, 1999)

Reactivity: STABILITY: This chemical is sensitive to air (may form explosive peroxides). It is also sensitive to heat. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions.REACTIVITY: This chemical is incompatible with caustic soda and other strong alkalies, hydrochloric acid, sulfuric acid and other strong inorganic acids, amines and oxidizing agents such as hydrogen peroxide, nitric acid, perchloric acid and chromium trioxide. It reacts violently with potassium tert-butoxide. It reacts violently with reducing materials. (NTP, 1992)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY transport the victim after flushing eyes to a hospital even if no contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the victim is convulsing, by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital if advised by a physician. If the

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All DOL OSHA

Page 1 of 3

Advanced Search

OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: METHANOL CAS #: 67-56-1

Formula: CH40

Synonyms: Carbinol; Columbian spirits; Methanol; Pyroligneous spirit; Wood alcohol; Wood naphtha; Wood spirit

UN No: 1230

Physical Properties					
Physical Description: Co	Physical Description: Colorless liquid with a characteristic pungent odor.				
BP : 147ºF	MW: 32.1	LEL: 6.0%	NFPA Fire Rating: 3		
FRZ/MLT: FRZ: -144°F	₹Z/MLT: FRZ: -144°F VP: 96 mmHg UEL: 36% NFPA Health Rating: 1				
FP: 52°F	VD: NA		NFPA Reactivity Rating: 0		
Sp. GR: 0.79 IP: 10.84 eV NFPA Sp. Inst.: NA					

Exposure Limits					
OSHA	NIOSH	Related Information			
PEL-TWA ppm: 200	REL-TWA ppm: 200	AIHA Emergency Response Planning Guidelines			
PEL-TWA mg/m3: 260	REL-TWA mg/m3: 260	- ERPG-1/ERPG-2/ERPG-3:			
PEL-STEL ppm: NA	REL-STEL ppm: 250				
PEL-STEL mg/m3: NA REL-STEL mg/m3: 325					
PEL-C ppm: NA	REL-C ppm: NA				
PEL-C mg/m3: NA REL-C mg/m3: NA		Carcinogen Classifications: NA			
Skin Notation: No Skin Notation: Yes					
Notes: NA	Notes: NA				
	IDLH ppm: 6000				
	IDLH mg/m3: NA				
	IDLH Notes: NA				

NIOSH Pocket Gui	de to Chemical Hazards (Cu	rrent through June 2006)		
Methyl alcohol	CAS: 67-56-1			
Formula: CH3OH			RTECS: PC1400000	
Synonyms & Trade Name Wood naphtha, Wood sp	es: Carbinol, Columbian spirits, Methan irit	ol, Pyroligneous spirit, Wood alcoho	, DOT ID & Guide: 1230 131	
Exposure Limits				
NIOSH REL: TWA 200 pp mg/m3) [skin]	m (260 mg/m3) ST 250 ppm (325	OSHA PEL : TWA 200 ppm (260	mg/m3)	
IDLH: 6000 ppm		Conversion: 1 ppm = 1.31 mg/r	m3	
Physical Description				
Colorless liquid with a ch	aracteristic pungent odor.			
MW: 32.1	BP: 147F	FRZ: -144F	Sol: Miscible	
VP: 96 mmHg	IP: 10.84 eV	RGasD: NA	Sp.Gr: 0.79	
Fl.P: 52F	UEL: 36%	LEL: 6.0%	MEC: NA	
Class IB Flammable Liqui	d (See flammable and combustible liqu	<u>iid classes</u>)		
Incompatibilities & Re	activities			
Strong oxidizers				
Measurement Method	s			
NIOSH 2000, 3800; OSH	A 91			
Personal Protection & Sanitation First Aid				
Skin: Prevent skin contac Eyes: Prevent eye contac Wash skin: When contar Remove: When wet (flan Change: N.R.	t t nm)	Eye: Irr immed Skin: Water flush prompt Breath: Resp support Swallow: Medical attention imm (<u>See procedures</u>)	ed	

NIOSH Respirator Recommendations

NIOSH/OSHA 2000 ppm: SA 5000 ppm: SA:CF 6000 ppm: SAT:CF/SCBAF/SAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: SCBAE (See symbols and codes)

Exposure Routes

Inh Abs Ing Con

Symptoms

Irrit eyes, skin, upper resp sys; head, drow, dizz, verti, li-head, nau, vomit; vis dist, optic nerve damage (blindness); derm See abbreviations)

Target Organs

Eyes, skin, resp sys, CNS, GI tract

(See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 131

131 Flammab	le Liquids - Toxic
POTENTIAL H	AZARDS

HEALTH

- TOXIC; may be fatal if inhaled, ingested or absorbed through skin. Inhalation or contact with some of these materials will irritate or burn skin and eyes.
- Fire will produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

FIRE OR EXPLOSION

- HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion and poison hazard indoors, outdoors or in sewers.
- Those substances designated with a P may polymerize explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.

PUBLIC SAFETY

- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate
- telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 100 to 200 meters
- (330 to 660 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas. Ventilate closed spaces before entering.
- PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA). Wear chemical protective clothing which is specifically recommended by
- the manufacturer. It may provide little or no thermal protection. Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill

situations. EVACUATION

Spill

See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under PUBLIC SAFETY.

Fire

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

- CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.
- Small Fires
- Dry chemical, CO2, water spray or alcohol-resistant foam. Large Fires
- Water spray, fog or alcohol-resistant foam.
- Move containers from fire area if you can do it without risk.
- Dike fire control water for later disposal; do not scatter the material.
- Use water spray or fog; do not use straight streams.
- Fire involving Tanks or Car/Trailer Loads
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after

fire is out.

- Withdraw immediately in case of rising sound from venting safety
- devices or discoloration of tank.
- * ALWAYS stay away from tanks engulfed in fire.
- * For massive fire, use unmanned hose holders or monitor nozzles; if this
- is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.
- * ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- * All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.

Small Spills

- Absorb with earth, sand or other non-combustible material and transfer to containers for later disposal.
- Use clean non-sparking tools to collect absorbed material.
- Large Spills
- * Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way val

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to disperse vapors and dilute standing pools of liquid. Apply water spray or mist to knock down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Water spill: Allow to aerate. Use natural barriers or oil spill control booms to limit spill travel. Remove trapped material with suction hoses. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use "alcohol" foam, dry chemical or carbon dioxide. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Acetyl bromide reacts violently with alcohols or water (Merck 11th ed. 1989). Mixtures of alcohols with concentrated sulfuric acid and strong hydrogen peroxide can cause explosions. Example: an explosion will occur if dimethylbenzylcarbinol is added to 90% hydrogen peroxide then acidified with concentrated sulfuric acid. Mixtures of ethyl alcohol with concentrated hydrogen peroxide form powerful explosives. Mixtures of hydrogen peroxide and 1-phenyl-2-methyl propyl alcohol tend to explode if acidified with 70% sulfuric acid (Chem. Eng. News 45(43):73. 1967; J, Org. Chem. 28:1893. 1963). Alkyl hypochlorites are violently explosive. They are readily obtained by reacting hypochlorous acid and alcohols either in aqueous solution or mixed aqueous-carbon tetrachloride solutions. Chlorine plus alcohols would similarly yield alkyl hypochlorites. They decompose in the cold and explode on exposure to sunlight or heat. Tertiary hypochlorites are less unstable than secondary or primary hypochlorites (NFPA 491 M. 1991). Base-catalysed reactions of isocyanates with alcohols should be carried out in inert solvents. Such reactions in the absence of solvents often occur with explosive violence, (Wischmeyer 1969). A violent exothermic reaction occured when methyl alcohol and bromine were mixed in a mixing cylinder (MCA Case History 1863. 1972). A flask of anhydrous lead perchlorate dissolved in methyl alcohol exploded when it was disturbed (J. Am. Chem. Soc. 52:2391. 1930). (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

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http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=387



UNITED STATES DEPARTMENT OF LABOR Occupational Safety & Health Administration

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OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: MERCURY, ELEMENTAL AND INORGANIC COMPOUNDS, as Hg CAS #: 7439-97-6 UN No: 2809

Formula: Hg

Synonyms: Mercury metal: Colloidal mercury; Metallic mercury; Quicksilver Synonyms of "other" Hg compounds vary depending upon the specific compound.

Physical Properties					
Physical Description: [Note: Note: N	Physical Description: [Note: "Other" Hg compounds include all inorganic & aryl Hg compounds except				
BP : 674ºF	MW: 200.6	LEL: NA	NFPA Fire Rating: NA		
FRZ/MLT: FRZ: -38°F	/MLT: FRZ: -38°F VP: 0.0012 mmHg UEL: NA NFPA Health Rating: NA				
FP: NA	VD: NA		NFPA Reactivity Rating: NA		
Sp. GR: 13.6 (metal) IP: NA NFPA Sp. Inst.: NA					

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: NA	REL-TWA ppm: NA	AIHA Emergency Response Planning Guidelines
PEL-TWA mg/m3: NA	REL-TWA mg/m3 : 0.05	- ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: 0.1	REL-C mg/m3 : 0.1	Carcinogen Classifications: IARC-3, TLV-A4
Skin Notation: No	Skin Notation: Yes	
Notes: NA	Notes: TWA IS FOR Hg VAPOR	
	IDLH ppm: NA	
	IDLH mg/m3: 10	
	IDLH Notes: NA	

NIOSH Pocket Guide to	Chemical Hazards (Current	through June 2006)		
Mercury compounds	CAS: 7439-97-6			
Formula: Hg (metal)			RTECS: OV4550000 (metal)	
Synonyms & Trade Names: Men other"Hgcompoundsvarydepend	cury metal: Colloidal mercury, Metallic dinguponthespecificcompound."	mercury, Quicksilver Synonyms of	DOT ID & Guide: 2809 172	
Exposure Limits				
NIOSH REL: Hg Vapor: TWA 0. [skin]	05 mg/m3 [skin] Other: C 0.1 mg/m3	OSHA PEL : C 0.1 mg/m3		
IDLH: 10 mg/m3 (as Hg)		Conversion: NA		
Physical Description				
Metal: Silver-white, heavy, odo	rless liquid. [Note: Other"Hgcompound	sincludeallinorganic&arylHgcompoun	dsexcept(organo)alkyls.]"	
MW: 200.6	BP: 674F	FRZ: -38F	Sol: Insoluble	
VP: 0.0012 mmHg	IP: ?	RGasD: NA	Sp.Gr: 13.6 (metal)	
I.P: NA UEL: NA		LEL: NA	MEC: NA	
Metal: Noncombustible Liquid (See flammable and combustible liquid	<u>classes</u>)		
Incompatibilities & Reactiv	ties			
Acetylene, ammonia, chlorine d	ioxide, azides, calcium (amalgam form	ation), sodium carbide, lithium, rubid	lium, copper	
Measurement Methods				
NIOSH 6009; OSHA ID140				
Personal Protection & Sanitation First Aid				
Skin: Prevent skin contact Eyes: N.R. Wash skin: When contam Remove: When wet or contam Change: Daily		Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed (<u>See procedures</u>)		

Page 1 of 3

1	
NIOS	SH Respirator Recommendations
See A mg/m SA:PE (<u>See</u> :	ppendix E for Respirator Recommendations for Mercury compounds [except (organo) alkyls]. Mercury vapor: NIOSH/OSHA 0.5 i3: CCRS /SA 1.25 mg/m3: SA:CF/PAPRS (canister) 2.5 mg/m3: CCRFS /GMFS /SAT:CF/PAPRTS(canister)/SCBAF/SAF 28 mg/m3:),PP : symbols and codes)
Expo	sure Routes
Inh A	he Ing Con
Sum.	
Junit	utonis
low-w (<u>See</u> a	yes, skin, cough, chest pain, dysp, bron pheulus, tremor, insom, inty, indecision, nead, ng, weak, stomatius, saw, Gruist, anor, igt; prot <u>abbreviations</u>)
Targ	et Organs
Eyes, (<u>See</u>	skin, resp sys, CNS, kidneys abbreviations)
DOT	Emergency Response Guidebook (ERG 2004)
Guid	e Number: 172
172 (POTE HEAI	Gallium and Mercury INTIAL HAZARDS TH
*	Inhalation of vapors or contact with substance will result in
	contamination and potential harmful effects.
* EIDE	Fire will produce irritating, corrosive and/or toxic gases.
*	Non-combustible, substance itself does not burn but may react upon
	heating to produce corrosive and/or toxic fumes.
*	Runoff may pollute waterways.
PUBL	LIC SAFETY CALL Emerganey Response Telephone Number on Shinning Daner first. If
-1-	CALL Emergency Response Telephone Number on Shipping Paper Inst. If Shipping Paper not available or no answer, refer to appropriate
	telephone number listed on the inside back cover.
*	Isolate spill or leak area immediately for at least 10 to 25 meters
	(30 to 80 feet) in all directions.
*	Stay upwind.
PRO	
*	Wear positive pressure self-contained breathing apparatus (SCBA).
*	Structural firefighters' protective clothing will only provide limited
EVAC	
Large	Spill
*	Consider initial downwind evacuation for at least 100 meters
	(330 feet).
Fire	
*	when any large container is involved in a fire, consider initial evacuation for 500 meters (1/3 mile) in all directions
EME	RGENCY RESPONSE
FIRE	
*	Use extinguishing agent suitable for type of surrounding fire.
* CDII	Do not direct water at the heated metal.
3FIL *	Do not touch or walk through spilled material.
*	Do not touch damaged containers or spilled material unless wearing
	appropriate protective clothing.
*	Stop leak it you can do it without risk.
*	Do not use steel or aluminum tools or equipment.
*	Cover with earth, sand, or other non-combustible material followed
l.	with plastic sheet to minimize spreading or contact with rain.
*	For mercury, use a mercury spill kit.
-1-	riercury spin areas may be subsequency treated with calcium sulphide/calcium sulfide or with sodium thiosulphate/sodium
	thiosulfate wash to neutralize any residual mercury.
FIRS	TAID
*	Move victim to fresh air.
*	Call 911 or emergency medical service.
*	Administer oxvaen if breathing is difficult.
*	Remove and isolate contaminated clothing and shoes.
*	In case of contact with substance, immediately flush skin or eyes with
ч.	running water for at least 20 minutes.
*	Keep victim warm and quiet.
	and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. (AAR, 1999)

Firefighting: Cool all affected containers with flooding quantities of water. Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Use water in flooding quantities as fog. Keep run-off water out of sewers and water sources. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Insoluble, explosive acelylide is formed by mixing acetylene and mercury. Ammonia and mercury can form explosive compounds. A residue resulting from such a reaction exploded when an attempt was made to clean it off a steel rod (Chem. Eng. News 25:2138. 1947). Chlorine dioxide and mercury explode when mixed (Mellor 2, Supp. 1:381. 1956). Methyl azide in the presence of mercury was shown to be potentially explosive (Can. J. Chem. 41:1048. 1963). Ground mixtures of sodium carbide and mercury, aluminum, lead, or iron can react vigorously (Mellor 5:848. 1946-47). (REACTIVITY, 1999)

First Aid: Eye: If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. Skin: If this chemical contacts the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates the clothing promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly. Breathing: If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible. Swallow: If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1997)

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SYNUTYINS , Manyang		ilolual manyanese,	Manganese-5			vary depending upon the specific	
nanganese compoun	ia.						
Physical Proper	rties						
Physical Descriptic	on: A lustrous	, brittle, silvery soli	d				
BP: 3564ºF	MW:	54.9	LEL: NA	NFPA Fire	NFPA Fire Rating: NA		
FRZ/MLT: MLT: 227	71ºF VP : 0	mmHg (approx)	g (approx) UEL: NA NFPA Hea				
FP: NA VD: NA		Α	NFPA Reac		tivity Rating: NA		
Sp. GR: 7.20 (metal) IP: NA				NFPA Sp. Inst.: NA			
Exposure Limits	S				Duby 11.5	- 11	
		NIOSH	N14		Related Inform	ation	
PEL-TWA ppm: NA		REL-TWA	opm: NA		AIHA Emergeno	ey Response Planning Guideline	
PEL-IWA mg/m3:	NA	REL-TWA	mg/m3: 1				
PEL-STEL ppm: NA		REL-STEL	ppm: NA		4		
PEL-SIEL mg/m3:	NA	REL-STEL	mg/m3:3		-		
			1: NA		Carolnogon Cla	scifications. MA	
Skin Notation: No		Skin Notot	ion: No			SSINCATIONS: INA	
					4		
NOLES. NA			- NA		-		
		I DELI PPIII			4		
			m3 : 500		-		
		IDLH mg/I	m3: 500 s: NA		-		
		IDLH mg/ IDLH Note	m3: 500 s: NA		-		
NIOSH Pocket	Guido to (IDLH mg/I	m3: 500 s: NA	nt through			
NIOSH Pocket (Guide to (IDLH mg/i IDLH Note	m3: 500 s: NA rds (Curre	nt through	June 2006)		
NIOSH Pocket (Manganese co	Guide to (mpounds	IDLH mg/i IDLH Note Chemical Haza and fume (as	m3: 500 s: NA rds (Curre s Mn)	nt through	June 2006)	CAS: 7439-96-5	
NIOSH Pocket (Manganese co Formula: Mn (metal)	Guide to (mpounds	IDLH mg/i IDLH Note Chemical Haza and fume (as	m3: 500 s: NA rds (Curre s Mn)	nt through	June 2006)	CAS: 7439-96-5 RTECS: OO9275000 (metal)	
NIOSH Pocket (Manganese co Formula: Mn (metal) Synonyms & Trade N other compounds var	Guide to (mpounds) Names: Manga ry depending	IDLH mg/i IDLH Note Chemical Haza and fume (as nese metal: Colloid upon the specific m	m3: 500 s: NA rds (Curre s Mn) al manganese anganese cor	nt through , Manganese-5 npound.	June 2006)	CAS: 7439-96-5 RTECS: OO9275000 (metal) DOT ID & Guide: NA	
NIOSH Pocket (Manganese co Formula: Mn (metal) Synonyms & Trade N other compounds var Exposure Limits	Guide to (mpounds Names: Manga ry depending	IDLH mg/i IDLH Note Chemical Haza and fume (as nese metal: Colloid upon the specific m	m3: 500 s: NA rds (Curre s Mn) al manganese anganese cor	nt through , Manganese-S npound.	June 2006) 55 Synonyms of	CAS: 7439-96-5 RTECS: OO9275000 (metal) DOT ID & Guide: NA	
NIOSH Pocket (Manganese co Formula: Mn (metal) Synonyms & Trade N other compounds var Exposure Limits NIOSH REL*: TWA 1 listings for Manganes cyclopentadienyl mar tetroxide.]	Guide to (mpounds) Names: Manga ry depending	IDLH mg/r IDLH Note IDLH Note Chemical Haza and fume (as nese metal: Colloid upon the specific m mg/m3 [*Note: Als lienyl tricarbonyl, M bonyl, and Mangan	m3: 500 s: NA rds (Curre s Mn) al manganese anganese cor o see specific lethyl ese	nt through e, Manganese-5 npound. OSHA PEL*: 0 Manganese c manganese ti	a June 2006) 55 Synonyms of C 5 mg/m3 [*Note: yclopentadienyl tricaricarbonyl.]	CAS: 7439-96-5 RTECS: OO9275000 (metal) DOT ID & Guide: NA Also see specific listings for arbonyl and Methyl cyclopentadieny	
NIOSH Pocket (Manganese co Formula: Mn (metal) Synonyms & Trade N other compounds var Exposure Limits NIOSH REL*: TWA 1 listings for Manganes cyclopentadienyl mar tetroxide.] IDLH: 500 mg/m3 (a	Guide to (mpounds) Names: Manga ry depending . mg/m3 ST 3 se cyclopenta nganese trical	IDLH mg/i IDLH Note Chemical Haza and fume (as nese metal: Colloid upon the specific m mg/m3 [*Note: Als lienyl tricarbonyl, M bonyl, and Mangan	m3: 500 s: NA rds (Curre s Mn) al manganese anganese cor o see specific lethyl ese	nt through , Manganese-5 npound. OSHA PEL*: (Manganese t manganese t Conversion: 1	June 2006) 55 Synonyms of C 5 mg/m3 [*Note: yclopentadienyl tric ricarbonyl.]	CAS: 7439-96-5 RTECS: OO9275000 (metal) DOT ID & Guide: NA Also see specific listings for arbonyl and Methyl cyclopentadieny	
NIOSH Pocket (Manganese co Formula: Mn (metal) Synonyms & Trade N other compounds var Exposure Limits NIOSH REL*: TWA 1 listings for Manganes cyclopentadienyl mar tetroxide.] IDLH: 500 mg/m3 (a Physical Descriptic	Guide to (mpounds) Names: Manga ry depending mg/m3 ST 3 se cyclopentad nganese tricar as Mn) on	IDLH mg/i IDLH Note Chemical Haza and fume (as nese metal: Colloid upon the specific m mg/m3 [*Note: Als tienyl tricarbonyl, M bonyl, and Mangan	m3: 500 s: NA rds (Curre s Mn) al manganese anganese cor o see specific lethyl ese	nt through e, Manganese-S npound. OSHA PEL*: (Manganese t manganese t Conversion: N	55 Synonyms of C 5 mg/m3 [*Note: yclopentadienyl trici ricarbonyl.]	CAS: 7439-96-5 RTECS: OO9275000 (metal) DOT ID & Guide: NA Also see specific listings for arbonyl and Methyl cyclopentadieny	
NIOSH Pocket (Manganese co Formula: Mn (metal) Synonyms & Trade N other compounds var Exposure Limits NIOSH REL*: TWA 1 listings for Manganes cyclopentadienyl mar tetroxide.] IDLH: 500 mg/m3 (a Physical Descriptic A lustrous, brittle, silv	Guide to (mpounds) Names: Manga ry depending mg/m3 ST 3 se cyclopentaa nganese tricar as Mn) on very_solid.	IDLH mg/i IDLH Note Chemical Haza and fume (as nese metal: Colloid upon the specific m mg/m3 [*Note: Als tienyl tricarbonyl, M bonyl, and Mangan	m3: 500 s: NA rds (Curre s Mn) al manganese anganese cor o see specific lethyl ese	nt through e, Manganese-5 npound. OSHA PEL*: (Manganese c manganese t Conversion: N	June 2006) 55 Synonyms of 55 Synonyms of 55 C 5 mg/m3 [*Note: yclopentadienyl tricaricarbonyl.]	CAS: 7439-96-5 RTECS: OO9275000 (metal) DOT ID & Guide: NA Also see specific listings for arbonyl and Methyl cyclopentadieny	
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NIOSH Pocket (Manganese co Formula: Mn (metal) Synonyms & Trade N other compounds var Exposure Limits NIOSH REL*: TWA 1 listings for Manganes cyclopentadienyl mar tetroxide.] IDLH: 500 mg/m3 (a Physical Descriptic A lustrous, brittle, silv MW: 54.9 VP: 0 mmHg (approx	Guide to (mpounds) Names: Manga ry depending . mg/m3 ST 3 se cyclopentad nganese trical as Mn) on (very solid.	IDLH mg/r IDLH Note IDLH Note Chemical Haza and fume (as nese metal: Colloid upon the specific m mg/m3 [*Note: Als lienyl tricarbonyl, M bonyl, and Mangan BP: 3564F IP: NA	m3: 500 s: NA rds (Curre s Mn) al manganese anganese cor o see specific lethyl ese	nt through , Manganese-5 npound. OSHA PEL*: (Manganese t Manganese t Conversion: N MLT: 2271F RGasD: NA	55 Synonyms of C 5 mg/m3 [*Note: yclopentadienyl tricc ricarbonyl.]	CAS: 7439-96-5 RTECS: OO9275000 (metal) DOT ID & Guide: NA Also see specific listings for arbonyl and Methyl cyclopentadieny Sol: Insoluble Sp.Gr: 7.20 (metal)	
NIOSH Pocket (Manganese co Formula: Mn (metal) Synonyms & Trade N other compounds var Exposure Limits NIOSH REL*: TWA 1 listings for Manganes cyclopentadienyl mar tetroxide.] IDLH: 500 mg/m3 (a Physical Descriptic A lustrous, brittle, silw MW: 54.9 VP: 0 mmHg (approx FI.P: NA	Guide to (mpounds) Names: Manga ry depending mg/m3 ST 3 se cyclopentad nganese tricar as Mn) on very solid.	IDLH mg/r IDLH Note IDLH Note Chemical Haza and fume (as nese metal: Colloid upon the specific m mg/m3 [*Note: Als lienyl tricarbonyl, M bonyl, and Mangan BP: 3564F IP: NA UEL: NA	m3: 500 s: NA rds (Curre s Mn) al manganese anganese cor o see specific lethyl ese	nt through e, Manganese-5 npound. OSHA PEL*: (Manganese c manganese t Conversion: N Conversion: N MLT: 2271F RGasD: NA LEL: NA	a June 2006) 55 Synonyms of C 5 mg/m3 [*Note: yclopentadienyl trici ricarbonyl.]	CAS: 7439-96-5 RTECS: OO9275000 (metal) DOT ID & Guide: NA Also see specific listings for arbonyl and Methyl cyclopentadieny Sol: Insoluble Sp.Gr: 7.20 (metal) MEC: NA	
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Remove: N.R. Change: N.R.	(See procedures)
NIOSH Respirator Recommendations	
NIOSH 10 mg/m3: DMXSQ^/SA 25 mg/m3: SA:CF/PAPRDM^ 50 n SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE (See symbols and codes)	ng/m3: HiEF/SAT:CF/PAPRTHiE/SCBAF/SAF 500 mg/m3: SA:PD,PP :
Exposure Routes	
Inh Ing	
Symptoms	
Parkinson's; asthenia, insom, mental conf; metal fume fever: dry t vomit; mal; ftg; kidney damage (<u>See abbreviations</u>)	hroat, cough, chest tight, dysp, rales, flu-like fever; low-back pain;
Target Organs	
Resp sys, CNS, blood, kidneys (<u>See abbreviations</u>)	
DOT Emergency Response Guidebook (ERG 200	4)
Guide: NA	
Additional Emergency Response Information (CA	AMEO Data)
Non-fire Spill Response: NA	
Firefighting: NA	
Reactivity: CHEMICAL PROFILE: During a fire in an industrial bag an explosion resulted (Occ. Haz. 28:185-7. 1946-47). Powdered m reaction takes place with incandescence (Mellor 12:185, 344. 1946 incandescence and a feeble explosion (Mellor 12:188. 1946-47). M (2) 2:317). Manganese burns with a brilliant flame when heated in	g filter, a mixture of aluminum and manganese dusts was released and anganese ignites in chlorine and burns brilliantly; with fluorine the 5-47). Concentrated nitric acid reacts with manganese with langanese or potassium ignites in nitrogen dioxide (Ann. Chim. et Phys. sulfur dioxide vapor (Mellor 12:187. 1946-47). (REACTIVITY, 1999)
First Aid: Breathing: If a person breathes large amounts of this ch stopped, perform mouth-to-mouth resuscitation. Keep the affected Swallow: If this chemical has been swallowed, get medical attentic	hemical, move the exposed person to fresh air at once. If breathing has a person warm and at rest. Get medical attention as soon as possible. on immediately. (NIOSH, 1997)
Freedom of Information Act Privacy & Security Statement Disclaimers	s Customer Survey Important Web Site Notices International Contact Us
U.S. Department of Labor Occupational Safety & Health A Telephone: 800-321-OSH	

Page 1 of 2



Remove: When wet or contam Swallow: Medical attention immed Change: Daily Swallow: Medical attention immed NIOSH Respirator Recommendations Softa 0.5 mg/m3: HiE/SA 1.25 mg/m3: SA:CF/PAPRHiE 2.5 mg/m3: HiEF/SAT:CF/PAPRTHiE/SCBAF/SAF 50 mg/m3: SA:PD,PP 100 mg/m3: SA:PD,PP 100 mg/m3: SA:PD,PP 1 SCBAF:PD,PP/SAF:PD,PP/SAF:PD,PP/SAECBA Escape: HIEF/SCBAE See symbols and codes) Exposure Routes Inh Ing Con Symptoms Weak, lass, insom; facial pallor; anor, low-wgt, malnut; constip, abdom pain, colic; anemia; gingival lead line; tremor; para wrist, ankles; encephalopathy; kidney disease; irrit eyes; hypotension (See abbreviations) Target Organs NA Seabbreviations) DOT Emergency Response Guidebook (ERG 2004) Guide: NA Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: STORAGE PRECAUTIONS: You should store this chemical under refrigerated temperatures, and keep it away from oxidizing materials. (NTP, 1992) Friefighting: Fires involving this material can be controlled with a dry chemical, carbon dioxide, foam, or Halon extinguisher. (NTP, 1922) Reactivity: CHEMICAL PROFILE: In the presence of carbon, the combination of chlorine trifluoride with aluminum, copper, lead, magnesium, silver, tin, or zinc results in a violent reaction (Mellor 2, Supp. 1: 1956). A solution of sodium azide in copper pipe with lead
Change: Daily (See procedures) NIOSH Respirator Recommendations OSHA 0.5 mg/m3: HiE/SA 1.25 mg/m3: SA:CF/PAPRHIE 2.5 mg/m3: HIEF/SAT:CF/PAPRTHIE/SCBAF/SAF 50 mg/m3: SA:PD,PP 100 mg/m3: SA:PD,PP : SCBAF:PD,PP/SAF:PD,PP/SAF:PD,PP/SAF:BA Escape: HIEF/SCBAE (See symbols and codes) Exposure Routes Inh Ing Con Symptoms Weak, lass, insom; facial pallor; anor, low-wgt, malnut; constip, abdom pain, colic; anemia; gingival lead line; tremor; para wrist, ankles; encephalopathy; kidney disease; irrit eyes; hypotension (See abbreviations) Target Organs NA (See abbreviations) DOT Emergency Response Guidebook (ERG 2004) Guide: NA Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: STORAGE PRECAUTIONS: You should store this chemical under refrigerated temperatures, and keep it away from oxidizing materials. (NTP, 1992) Firefighting: Fires involving this material can be controlled with a dry chemical, carbon dioxide, foam, or Halon extinguisher. (NTP, 1992) Reactivity: CHEMICAL PROFILE: In the presence of carbon, the combination of chlorine trifluoride with aluminum, copper, lead, magnesium, silver, tin, or zinc results in a violent reaction (Mellor 2, Supp. 1: 1956). A solution of sodium azide in copper pipe with lead
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Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: STORAGE PRECAUTIONS: You should store this chemical under refrigerated temperatures, and keep it away from oxidizing materials. (NTP, 1992) Firefighting: Fires involving this material can be controlled with a dry chemical, carbon dioxide, foam, or Halon extinguisher. (NTP, 1992) Reactivity: CHEMICAL PROFILE: In the presence of carbon, the combination of chlorine trifluoride with aluminum, copper, lead, magnesium, silver, tin, or zinc results in a violent reaction (Mellor 2, Supp. 1: 1956). A solution of sodium azide in copper pipe with lead
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joints formed copper and lead azide, both are detonating compounds (Klotz 1973), (REACTIVITY, 1999)
First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: Some heavy metals are VERY TOXIC POISONS, especially if their salts are very soluble in water (e.g., lead, chromium, mercury, bismuth, osmium, and arsenic). IMMEDIATELY call a hospital or poison control center and locate activated charcoal, egg whites, or milk in case the medical advisor recommends administering one of them. Also locate Ipecac syrup or a glass of salt water in case the medical advisor recommends administering one of them. Also locate Ipecac syrup or a glass of salt water in case the medical advisor recommends administering one of them. Also locate Ipecac syrup or a glass of salt water in case the medical advisor recommends administering one of them. Also l
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) STAT TMEN	ES TOF LABO	R					ol 🧿	OSHA	Advanced Search
Occupation	nal Safety	/ & Health Adm	inistration			A to Z Index	En Español Co	ntact Us	What's N	lew About OSHA
OSHA Home					RSS Feeds	둼 Print This Page	•••	Text Size	🔀 E-Mail This Page	
OSHA/EPA Occu	pationa	I Chemical I	Databas	е						
Chamical Idantific	otion									
Chemical Name: IRON		ST & FUME as Fe								
CAS #: 1309-37-1	,,,	UN No:	1376		Formula	a: Fe2O3				
Synonyms: Ferric oxide;	; Iron(III) o	xide								
Physical Propertie	S							1		
Physical Description:	Reddish-bro	own solid. [Note: E	xposure to fu	ume may occur	during the arc-wel	ding of iron.]		1		
BP: NA MW: 159.7		9.7	LEL: NA		Rating: NA					
FRZ/MLT: MLT: 2664°F	• VP :0m	mHg (approx)	UEL: NA	NFPA Healt	th Rating: NA					
FP: NA	VD: NA				tivity Rating: NA			4		
Sp. GR: 5.24	IP: NA			NFPA Sp. II	nst.: NA					
Exposure Limits								1		
OSHA		NIOSH			Related Inform	ation				
PFI -TWA ppm: NA		RFL-TWA n	nm· NA		AIHA Emergeno	v Response Pla	nning Guidelines	1		
PFI -TWA mg/m3 : 10		RFI -TWA m	na/m3: 5		- ERPG-1/ERPG	-2/ERPG-3:				
PEL-TWA mg/m3: 10 REL		REL-TWAN	PEL-STEL nom: NA		NA					
PEL-STEL mg/m3: NA		REL-STEL n	L mg/m3: NA		-					
PEL-S rec mg/ms. NA REL-S rec mg/ms. NA REL-C ppm:			NA		-					
PEL-C mg/m3: NA REL-C		REL-C mg/i	EL-C mg/m3: NA		Carcinogen Classifications: TLV-A4, IARC-3			1		
Skin Notation: No		Skin Notati	ion: No							
Notes: FUME Notes: NA]					
		IDLH ppm:	NA							
		IDLH mg/n	13 : 2500							
		IDLH Notes	: NA							
NIOSH Pocket Gu	ide to Cł	nemical Hazar	ds (Curre	ent through	June 2006)			1		
Rouge						CAS: 1309-37-1				
Formula: Fe2O3						RTECS: NO7400	000			
Synonyms & Trade Name	es: Iron(III))oxide. Iron oxide r	ed. Red iron	oxide. Red oxi	de	DOT ID & Guide	: NA	1		
Exposure Limits		,,						1		
NIOSH REL: See Append	lix D			OSHA PEL : T\	WA 15 mg/m3 (tota	al) TWA 5 mg/m3	(resp)	1		
IDLH: N.D.			Conversion: N	A			1			
Physical Description								1		
A fine, red powder of fer	ric oxide. [I	Note: Usually used	in cake form	or impregnate	d in paper or cloth.]]		
MW: 159.7	E	3P: ?		MLT: 2849F		Sol: Insoluble				
VP: 0 mmHg (approx)	I	P: NA		RGasD: NA		Sp.Gr: 5.24				
FI.P: NA	ι	JEL: NA		LEL: NA		MEC: NA				
Noncombustible Solid (S	ee flammab	le and combustible	liquid classe	<u>es</u>)				1		
Incompatibilities & Re	eactivities							4		
Calcium hypochlorite, ca	rbon mono>	kide, hydrogen per	oxide					4		
Measurement Method	ls							4		
NIOSH 0500, 0600	• • •							-		
Personal Protection &	a Sanitatio	n		First Aid				-		
Skin: N.R. Eves: N.R.				Eye: Irr immed Breath: Fresh air			1			
Wash skin: N.R.								1		
change: N.R.				(See procedur	<u>es</u>)			1		
								1		

TBAL http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=230

NIOSH Respirator Recommendations

(See symbols and codes)
<u>See symbols and codes</u>)
Inh Con
Symptoms
Irrit eves, skin, resp svs
(See abbreviations)
Target Organs
Eyes, skin, resp sys
(<u>See abbreviations</u>)
DOT Emergency Response Guidebook (ERG 2004)
Guide Number: 135
135 Substances - Spontaneously Combustible
POTENTIAL HAZARDS
FIRE OR EXPLOSION * Elammable/combustible material
* May ignite on contact with moist air or moisture.
* May burn rapidly with flare-burning effect.
 Some react vigorously or explosively on contact with water. Some may decompose explosively when beated or involved in a fire.
* May re-ignite after fire is extinguished.
* Runoff may create fire or explosion hazard.
HEALTH * Fire will produce irritating, corrosive and/or toxic cases
* Inhalation of decomposition products may cause severe injury or death.
* Contact with substance may cause severe burns to skin and eyes.
 Kunorr from fire control may cause pollution. PUBLIC SAFETY
* CALL Emergency Response Telephone Number on Shipping Paper first. If
Shipping Paper not available or no answer, refer to appropriate
telephone number listed on the inside back cover. * Isolate spill or leak area immediately for at least 100 to 150 meters
(330 to 490 feet) in all directions.
* Stay upwind.
 Keep unauthorized personnel away. Keep out of low areas.
PROTECTIVE CLOTHING
 Wear positive pressure self-contained breathing apparatus (SCBA). Wear phase is a labelian which is a self-failly uncertained by
the manufacturer. It may provide little or no thermal protection.
* Structural firefighters' protective clothing will only provide limited
protection.
Spill
* See the Table of Initial Isolation and Protective Action Distances for
nignlighted substances. For non-nignlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown
under PUBLIC SAFETY.
Fire * If tank, rail car or tank truck is involved in a fire ISOLATE for
800 meters (1/2 mile) in all directions; also, consider initial
evacuation for 800 meters (1/2 mile) in all directions.
EMERGENCY RESPONSE FIRE
* DO NOT USE WATER, CO2 OR FOAM ON MATERIAL ITSELF.
* Some of these materials may react violently with water.
UN1929. USE FLOODING AMOUNTS OF WATER for SMALL AND LARGE fires to
stop the reaction. Smothering will not work for these materials.
They do not need air to burn.
 The second s
UN1929.
Large Fires The DRY sand dry chemical soda ash or lime FXCEPT for UN1384 UN1923 and
UN1929, or withdraw from area and let fire burn.
* Move containers from fire area if you can do it without risk.
rire involving Tanks or Car/Trailer Loads Fight fire from maximum distance or use unmanned hose holders or
monitor nozzles.
 Do not get water inside containers or in contact with substance. Cool containers with floading quantities of water with well a few
 Cool containers with flooding quantities of water until well after fire is out.
* Withdraw immediately in case of rising sound from venting safety
devices or discoloration of tank.
SPILL OR LEAK
* Fully encapsulating, vapor protective clothing should be worn for

spills and leaks with no fire. ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch or walk through spilled material. Stop leak if you can do it without risk. Small Spills EXCEPTION: For Dithionite (Hydrosulfite/Hydrosulphite) spills, UN1384, UN1923 and UN1929, dissolve with 5 parts water and collect for proper disposal. Cover with DRY earth, DRY sand, or other non-combustible material followed with plastic sheet to minimize spreading or contact with rain. Use clean non-sparking tools to collect material and place it into loosley covered plastic containers for later disposal. Prevent entry into waterways, sewers, basements or confined areas. FIRST AID Move victim to fresh air. Call 911 or emergency medical service. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. (AAR, 1999)

Firefighting: Flood with water. (AAR, 1999)

Reactivity: AIR AND WATER REACTIONS: Iron(II) oxide - the finely divided oxide prepared by reduction may be pyrophoric in air at ambient temperature, Bailar, 1973, vol.3, 1008-1009.CHEMICAL PROFILE: Many serious accidents have occurred that caused explosions in the container. Oxygen is generated by the reaction of calcium hypochlorite and iron oxide or manganese oxide, Ind. Eng. Chem. 16:577(1924). Alkali metal hydroxides, acids, anhydrous chlorides of iron, tin, and aluminum, pure oxides of iron and aluminum, and metallic potassium are some of the catalysts that may cause ethylene oxide to rearrange and polymerize, liberating heat, J. Soc. Chem. Ind. 68:179(1949). Explosions occur , although infrequently, from the combination of ethylene oxide and alcohols or mercaptans, Chem. Eng. News 20:1318(1942). While boiling a piece of polester fiber in hydrazine in a glass beaker, the technician used a somewhat rusty pair of metal tweezers. When the tweezers were put into the solution it ignited, MCA Case History 1893(1973). A pyrophoric iron sulfide was made from hydrated iron oxide and hydrogen sulfide under gasoline, Ellern, p33(1968). (REACTIVITY, 1999)

First Aid: Move victim to fresh air. Call emergency medical care. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. (DOT, 1996)

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OSHA/FPA Occupational Chemical Database	
Sonny Er A Steapational Shernical Batabase	
Chemical Identification	
Chemical Name: ETHYL BENZENE	
CAS #: 100-41-4 UN No: 1175	Formula: C8H10
Synonyms: Ethylbenzol; Phenylethane	
Physical Properties	
Physical Description: Colorless liquid with an aromatic odor.	
BP: 277°F MW: 106.2 LEL: 0.8% NFPA Fire Rat	ting: 3
FRZ/MLT: FRZ: -139°F VP: 7 mmHg UEL: 6.7% NFPA Health I	Rating: 2
FP: 55°F VD: NA NFPA Reactive	ity Rating: 0
Sp. GR: 0.87 IP: 8.76 eV NFPA Sp. Inst	1.: NA
Exposure Limits	
OSHA NIOSH R	elated Information
PEL-TWA ppm: 100 REL-TWA ppm: 100 A	IHA Emergency Response Planning Guidelines
PEL-TWA mg/m3: 435	ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA REL-STEL ppm: 125	
PEL-STEL mg/m3: NA REL-STEL mg/m3: 545	
PEL-C ppm: NA REL-C ppm: NA	
PEL-C mg/m3: NA REL-C mg/m3: NA C	arcinogen Classifications: IARC-2B, TLV-A3
Skin Notation: No Skin Notation: No	
Notes: NA Notes: NA	
IDLH ppm: 800	
IDLH mg/m3: NA	
IDLH Notes: 10% of LEL	
NIOSH Pocket Guide to Chemical Hazards (Current through Ju	une 2006)
Fthyl benzene	CAS: 100-41-4
Formula: CH3CH2C6H5	RTECS: DA0700000
Synonyms & Trade Names: Ethylbenzol, Phenylethane	DOT ID & Guide: 1175 130
Exposure Limits	
NIOSH REL: TWA 100 ppm (435 mg/m3) ST 125 ppm (545 OSHA PEL : TWA mg/m3)	100 ppm (435 mg/m3)
IDLH: 800 ppm [10%LEL] Conversion: 1 ppr	m = 4.34 mg/m3
Physical Description	
Colorless liquid with an aromatic odor.	
MW: 106.2 BP: 277F FRZ: -139F	Sol: 0.01%
VP: 7 mmHg IP: 8.76 eV RGasD: NA	Sp.Gr: 0.87
FI.P: 55F UEL: 6.7% LEL: 0.8%	MEC: NA
Class IB Flammable Liquid (See flammable and combustible liquid classes)	
Incompatibilities & Reactivities	
Strong oxidizers	
Measurement Methods	
NIOSH 1501; OSHA 7, 1002	
Personal Protection & Sanitation First Aid	
Skin: Prevent skin contact Eye: Irr immed	
Wash skin: When contact Skin: Water flush Breath: Resp sup	prompt
Remove: When wet (flamm) Swallow: Medical	attention immed
Change: N.R. (See procedures)	

NIOSH Respirator Recommendations

NIOSH/OSHA 800 ppm: CCROV*/GMFOV/PAPROV*/SA*/SCBAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE (See symbols and codes) Exposure Routes

Inh Ing Con Symptoms

Irrit eyes, skin, muc memb; head; derm; narco, coma (See abbreviations)

Target Organs

Eyes, skin, resp sys, CNS (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 129

129	Flammable Liquids (Polar/Water-Miscible/Noxious)
РОТ	ENTIAL HAZARDS
FIRE	E OR EXPLOSION
*	HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
*	Vapors may form explosive mixtures with air.
*	Vapors may travel to source of ignition and flash back.
*	Most vapors are heavier than air. They will spread along ground and
	collect in low or confined areas (sewers, basements, tanks).
*	Vapor explosion hazard indoors, outdoors or in sewers.
*	Those substances designated with a P may polymerize explosively when
	heated or involved in a fire.
*	Runoff to sewer may create fire or explosion hazard.
*	Containers may explode when heated.
*	Many liquids are lighter than water.
HEA	LTH
*	May cause toxic effects if inhaled or absorbed through skin.
*	Inhalation or contact with material may irritate or burn skin and eyes.
*	Fire will produce irritating, corrosive and/or toxic gases.
*	Vapors may cause dizziness or suffocation.
*	Runoff from fire control or dilution water may cause pollution.
PUB	LIC SAFETY
l^	CALL Emergency Response Telephone Number on Shipping Paper first. If
	Shipping Paper not available or no answer, refer to appropriate
ц.	telephone number listed on the inside back cover.
Ŷ	Isolate spill or leak area immediately for at least 50 to 100 meters
*	(100 to 330 feet) in all directions.
*	Reep unauthorized personnel away.
*	Sidy upwillu. Keep out of low areas
*	Ventilate closed spaces before entering
DDO	
*	Wear positive pressure self-contained breathing apparatus (SCBA)
*	Structural firefighters' protective clothing will only provide limited
	protection.
EVA	CUATION
Larg	e Spill
*	Consider initial downwind evacuation for at least 300 meters
	(1000 feet).
Fire	
*	If tank, rail car or tank truck is involved in a fire, ISOLATE for
	800 meters (1/2 mile) in all directions; also, consider initial
	evacuation for 800 meters (1/2 mile) in all directions.
EME	RGENCY RESPONSE
FIRE	
CAU	TION: All these products have a very low flash point: Use of water spray
	when fighting fire may be inefficient.
Smal	I FIRES
Ť.	Dry chemical, CO2, water spray or alconol-resistant foam.
Ŷ	Do not use dry chemical extinguishers to control fires involving
1	niu omeunane of filutoeunane.
Lary	Water enroy fog er aleshel registant foam
*	Nalei spidy, iog of alconol-resistant foant.
*	Move containers from fire area if you can do it without risk
Fire	involving Tanks or Car/Trailer Loads
*	Fight fire from maximum distance or use unmanned hose holders or
	monitor nozzles
*	Cool containers with flooding quantities of water until well after
1	fire is out.
*	Withdraw immediately in case of rising sound from venting safety
1	devices or discoloration of tank.
*	ALWAYS stay away from tanks engulfed in fire.
*	For massive fire, use unmanned hose holders or monitor nozzles; if this
I I	is impossible, withdraw from area and let fire burn.
SPIL	L OR LEAK

- * ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- * All equipment used when handling the product must be grounded.
- * Do not touch or walk through spilled material.
- * Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- * A vapor suppressing foam may be used to reduce vapors.
- * Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- * Use clean non-sparking tools to collect absorbed material.

Large Spills

- * Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- * Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- * Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with
- running water for at least 20 minutes.
- * Wash skin with soap and water.
- * Keep victim warm and quiet.
- Effects of exposure (inhalation, ingestion or skin contact) to
- substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Apply "universal" gelling agent to immobilize spill. Apply approriate foam to diminish vapor and fire hazard. Water spill: Use natural barriers or oil spill control booms to limit spill travel. Use surface active agent (e.g. detergent, soaps, alcohols), if approved by epa. Inject "universal" gelling agent to solidify encircled spill and increase effectiveness of booms. If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may spread fire. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. (AAR, 1999)

Reactivity: STABILITY: This chemical is stable under normal laboratory conditions. Solutions of this chemical should be stable for 24 hours under normal lab conditions.REACTIVITY: This compound can react vigorously with strong oxidizing materials. (NTP, 1992)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY food affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY clal a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. Be prepared to transport the victim to a hospital if advised by a physician. If the victim is convulsing by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY calls on the obdy. DO NOT INDUCE VOMITING. IMMEDIATELY calls on the victim to a hospital if advised by a physician. If the victim is conscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with

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Page 1 of 3

OSHA/EPA Occupational Chemical Database - Full Report All DOL OSHA Advanced Search UNITED STATES SEARCH DEPARTMENT OF LABOR Occupational Safety & Health Administration A to Z Index | En Español | Contact Us | What's New | About OSHA **OSHA Home** 🔊 RSS Feeds 🛛 🗧 Print This Page 🗧 🛨 Text Size 🛛 🔤 E-Mail This Page OSHA/EPA Occupational Chemical Database Chemical Identification Chemical Name: ETHANOL CAS #: 64-17-5 UN No: 1987 Formula: C2H6O Synonyms: Alcohol; Cologne spirit; Ethanol; EtOH; Grain alcohol Physical Properties Physical Description: Clear, colorless liquid with a weak, ethereal, vinous odor. NFPA Fire Rating: NA BP: 173°F MW: 46.1 LEL: 3.3% FRZ/MLT: FRZ: -173°F VP: 44 mmHg **UEL**: 19% NFPA Health Rating: NA FP: 55°F VD: NA NFPA Reactivity Rating: NA Sp. GR: 0.79 IP: 10.47 eV NFPA Sp. Inst.: NA Exposure Limits OSHA NIOSH **Related Information** PEL-TWA ppm: 1000 REL-TWA ppm: 1000 AIHA Emergency Response Planning Guidelines ERPG-1/ERPG-2/ERPG-3: PEL-TWA mg/m3: 1900 REL-TWA mg/m3: 1900 NA PEL-STEL ppm: NA **REL-STEL ppm: NA** PEL-STEL mg/m3: NA REL-STEL mg/m3: NA PEL-C ppm: NA REL-C ppm: NA PEL-C mg/m3: NA REL-C mg/m3: NA Carcinogen Classifications: TLV-A4 Skin Notation: No Skin Notation: No Notes: NA Notes: NA **IDLH ppm: 3300** IDLH mg/m3: NA IDLH Notes: 10% of LEL NIOSH Pocket Guide to Chemical Hazards (Current through June 2006) CAS: 64-17-5 Ethyl alcohol Formula: CH3CH2OH RTECS: KQ6300000 Synonyms & Trade Names: Alcohol, Cologne spirit, Ethanol, EtOH, Grain alcohol DOT ID & Guide: 1170 127 Exposure Limits NIOSH REL: TWA 1000 ppm (1900 mg/m3) OSHA PEL: TWA 1000 ppm (1900 mg/m3) IDLH: 3300 ppm [10%LEL] Conversion: 1 ppm = 1.89 mg/m3 Physical Description Clear, colorless liquid with a weak, ethereal, vinous odor. MW: 46.1 BP: 173F FRZ: -173F Sol: Miscible VP: 44 mmHg IP: 10.47 eV RGasD: NA Sp.Gr: 0.79 Fl.P: 55F UEL: 19% LEL: 3.3% MEC: NA Class IB Flammable Liquid (See flammable and combustible liquid classes) Incompatibilities & Reactivities Strong oxidizers, potassium dioxide, bromine pentafluoride, acetyl bromide, acetyl chloride, platinum, sodium Measurement Methods NIOSH 1400; OSHA 100 Personal Protection & Sanitation First Aid Skin: Prevent skin contact Eve: Irr immed Eyes: Prevent eye contact Skin: Water flush prompt Wash skin: When contam Breath: Fresh air Swallow: Medical attention immed Remove: When wet (flamm) Change: N.R. (See procedures)

NIOSH/OSHA 3300 ppm: SA/SCBAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: SCBAE

NIOSH Respirator Recommendations

(See symbols and codes)

Exposure Routes

Inh Ing Con

Symptoms

Irrit eyes, skin, nose; head, drow, ftg, narco; cough; liver damage; anemia; repro, terato effects (See abbreviations)

Target Organs

Eyes, skin, resp sys, CNS, liver, blood, repro sys See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 127

1:	27 Flammable Liquids (Polar/Water-Miscible)
P	OTENTIAL HAZARDS
FI	IRE OR EXPLOSION
*	HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
*	Vapors may form explosive mixtures with air.
*	Vapors may travel to source of ignition and flash back.
*	Most vapors are heavier than air. They will spread along ground and
*	Collect in low or confined areas (sewers, basements, tanks).
*	These substances designated with a P may polymerize explosively when
Ľ	heated or involved in a fire
*	Runoff to sewer may create fire or explosion bazard
*	Containers may explode when heated.
*	Many liquids are lighter than water.
н	EALTH
*	Inhalation or contact with material may irritate or burn skin and eyes.
*	Fire may produce irritating, corrosive and/or toxic gases.
*	Vapors may cause dizziness or suffocation.
*	Runoff from fire control may cause pollution.
PI	UBLIC SAFETY
*	CALL Emergency Response Telephone Number on Shipping Paper first. If
	Shipping Paper not available or no answer, refer to appropriate
*	Telephone number listed on the inside back cover.
	(20 to 160 foot) in all directions
*	(or to reet) in all directions.
*	Stay unwind
*	Keep out of low areas.
*	Ventilate closed spaces before entering.
Ы	ROTECTIVE CLOTHING
*	Wear positive pressure self-contained breathing apparatus (SCBA).
*	Structural firefighters' protective clothing will only provide limited
	protection.
IE)	
Lc *	Consider initial downwind evacuation for at least 200 meters
L	(1000 faat)
Fi	re
*	If tank, rail car or tank truck is involved in a fire, ISOLATE for
	800 meters (1/2 mile) in all directions; also, consider initial
	evacuation for 800 meters (1/2 mile) in all directions.
E	MERGENCY RESPONSE
FI	IRE
C/	AUTION: All these products have a very low flash point: Use of water spray
	when fighting fire may be inefficient.
Sr	Nall FIRES
<u> </u>	Dry chemical, CO2, water spray or alconor-resistant roam.
*	Water spray, fog or alcohol-resistant foam
*	Lice water spray, nog of alcohol-resistant roam.
*	Move containers from fire area if you can do it without risk.
Fi	re involving Tanks or Car/Trailer Loads
*	Fight fire from maximum distance or use unmanned hose holders or
L	monitor nozzles.
*	Cool containers with flooding quantities of water until well after
1	fire is out.
*	Withdraw immediately in case of rising sound from venting safety
	devices or discoloration of tank.
*	ALWAYS stay away from tanks engulfed in fire.
*	For massive fire, use unmanned hose holders or monitor nozzles; if this
	is impossible, withdraw from area and let fire burn.
	PILL UK LEAK
1	in immediate area)

- All equipment used when handling the product must be grounded. Do not touch or walk through spilled material.

*

- * Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- * A vapor suppressing foam may be used to reduce vapors.
- * Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.
- Large Spills
- * Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- * Move victim to fresh air.
- Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
- * Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- * Wash skin with soap and water.
- Keep victim warm and quiet.
- * Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to disperse vapors and dilute standing pools of liquid. Apply water spray or mist to knock down vapors. Vapor knockdown water is corrosive or toxic and should be diked for containment. Land spill: Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Apply "universal" gelling agent to immobilize spill. Apply approriate foam to diminish vapor and fire hazard. Water spill: Remove trapped material with suction hoses. If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Acetyl chloride react violently with ethyl alcohol or water (Rose 1961). Acetyl bromide reacts violently with alcohols or water (Merck 11th ed. 1989). Mixtures of alcohols with concentrated sulfuric acid and strong hydrogen peroxide can cause explosions. Example: An explosion will occur if dimethylbenzylcarbinol is added to 90% hydrogen peroxide then acidified with concentrated sulfuric acid. Mixtures of ethyl alcohol with concentrated hydrogen peroxide form powerful explosives. Mixtures of hydrogen peroxide and 1-phenyl-2-methyl propyl alcohol tend to explode if acidified with 70% sulfuric acid (Chem. Eng. News 45(43):73. 1967; J, Org. Chem. 28:1893. 1963). Alkyl hypochlorites are violently explosive. They are readily obtained by reacting hypochlorous acid and alcohols either in aqueous solution or mixed aqueous-carbon tetrachloride solutions. Chlorine plus alcohols would similarly yield alkyl hypochlorites. They decompose in the cold and explode on exposure to sunlight or heat. Tertiary hypochlorites are less unstable than secondary or primary hypochlorites (NFPA 491 M. 1991). Base-catalysed reactions of isocyanates with alcohols should be carried out in inert solvents. Such reactions in the absence of solvents often occur with explosive violence (Wischmeyer 1969). (REACTIVITY, 1999)

First Aid: Move victim to fresh air; call emergency medical care. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. (AAR, 1999)

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Page 1 of 2



NIOSH Respirator Recommendations

NIOSH/OSHA 5 mg/m3: DM* 10 mg/m3: DMXSQ*^/SA* 25 mg/m3: SA:CF*/PAPRDM* 50 mg/m3: HiEF/PAPRTHiE*/SCBAF/SAF 100 mg/m3: SAF:PD,PP : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE (See symbols and codes)

Exposure Routes

Inh Ing Con

Symptoms

Irrit eyes, nose, pharynx; nasal septum perf; metallic taste; derm; in animals: lung, liver, kidney damage; anemia (See abbreviations)

Target Organs

Eyes, skin, resp sys, liver, kidneys (incr risk with Wilson's disease) (<u>See abbreviations</u>)

DOT Emergency Response Guidebook (ERG 2004)

Guide: NA

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: NA

Firefighting: NA

Reactivity: CHEMICAL PROFILE: In the presence of carbon, the combination of chlorine trifluoride with aluminum, copper, lead, magnesium, silver, tin, or zinc results in a violent reaction, Mellor 2, Supp. 1:(1956). Sodium peroxide oxidizes antimony, arsenic, copper, potassium, tin, and zinc with incandescence, Mellor 2:490-93(1946-1947). Unstable acetylides form when acetylene is passed over copper that has been heated enough to form a tarnish of oxide coating. A combination of finely divided copper with finely divided bromates(also chlorates and iodates) of barium, calcium, magnesium, potassium, sodium, or zinc will explode with heat, percussion, and sometimes light friction, Mellor 2:310(1946-1947). A solution of sodium azide in copper pipe with lead joints formed copper and lead azide, both are detonating compounds, Klotz(1973). (REACTIVITY, 1999)

First Aid: Eye: If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. Skin: If this chemical contacts the skin, promptly wash the contaminated skin with soap and water. If this chemical penetrates the clothing promptly remove the clothing and wash the skin with soap and water. Get medical attention promptly. Breathing: If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible. Swallow: If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1997)

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UN No:



UNITED STATES DEPARTMENT OF LABOR Occupational Safety & Health Administration

OSHA Home

CAS #: 65996-93-2

					SEARCH
A to Z Index	En Español Con	tact Us	What's N	ew Ab	out OSHA
RSS Feeds	🖶 Print This Page		ext Size	🖂 E-Mai	il This Page

All DOL OSHA

Page 1 of 3

Advanced Search

OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: COAL TAR PITCH VOLATILES

Formula:

Synonyms: Synonyms vary depending upon the specific compound (e.g., pyrene; phenanthrene; acridine; chrysene; anthracene & benzo (a)pyrene).

Physical Properties								
Physical Description: Odorless, silver-gray to black solid.								
BP: 5612°F MW: 58.9 LEL: NA NFPA Fire Rating: NA								
FRZ/MLT: FRZ: NA	VP: NA	UEL: 2719ºF	NFPA Health Rating: NA					
FP: NA	VD: NA		NFPA Reactivity Rating: NA					
Sp. GR: 8.92	IP: NA		NFPA Sp. Inst.: NA					

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: NA	REL-TWA ppm: NA	AIHA Emergency Response Planning Guidelines
PEL-TWA mg/m3: 0.2	REL-TWA mg/m3: 0.1	- ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: IARC-1, NIOSH-Ca,
Skin Notation: No	Skin Notation: No	NTP-K, TLV-A1
Notes: as BENZENE SOLUBLE FRACTION (ANTHRACENE, BaP, PHENANTHRENE, ACRIDINE, CHRYSENE, PYRENE); SEE 1910.1002 (DEFINITION)	Notes: CARCINOGEN (Ca); as CYCLOHEXANE-EXTRACTABLE FRACTION	
	IDLH ppm: NA	
	IDLH mg/m3: 80	
	IDLH Notes: Ca	

NIOSH Pocket Guide to Chemical Hazards (Current through June 2006)									
Coal tar pitch volatiles			CAS: 65996-93-2						
Formula: NA RTECS: GF8655000									
Synonyms & Trade Names: Synony phenanthrene, acridine, chrysene,	DOT ID & Guide: 2713 153								
Exposure Limits									
NIOSH REL: Ca TWA 0.1 mg/m3 (cyclohexane-extractable fraction) OSHA PEL: TWA 0.2 mg/m3 (benzene-soluble fraction) [1910.1002] See Appendix A See Appendix C									
IDLH: Ca [80 mg/m3]		Conversion: NA							
Physical Description	Physical Description								
Black or dark-brown amorphous re	Black or dark-brown amorphous residue.								
Properties vary depending upon the specific compound.	BP: NA	FRZ: NA	Sol: NA						
VP: NA	IP: NA	RGasD: NA	SG: NA						
FP: NA	UEL: NA	LEL: NA	MEC: NA						
Combustible Solids (See flammable	e and combustible liquid classes)								
Incompatibilities & Reactivitie	es								
Strong oxidizers									
Measurement Methods									
OSHA 58									
Personal Protection & Sanitati	on	First Aid							

OSH.	A/EPA Occupational Chemical Database	- Full Report
Skin	Prevent skin contact	Eve: Irr immed
Fves	Prevent eve contact	Skin: Soan wash immed
Wash	skin: Daily	Breath: Resp support
Remo	ve: N.R.	Swallow: Medical attention immed
Chang	je: Daily	(<u>See procedures</u>)
NIOS	H Respirator Recommendations	<u> </u>
NIOS	H : SCBAE:PD.PP/SAE:PD.PP:ASCBA Escape: GMEOVHiE/SCBA	=
(See	symbols and codes)	-
Ехро	sure Routes	
Inh C	on	
Symp	otoms	
Derm	, bron, [carc]	
Targe	at Organs	
Resp	svs, skin, bladder, kidnevs	
(<u>See</u> a	abbreviations)	
DOT	Emergency Response Guidebook (ERG 2004	•)
Guid	e Number: 153	
153 S	Substances - Toxic and/or Corrosive (Combustible)	
HEAL	TH	
*	TOXIC; inhalation, ingestion, or skin contact with material ma	y cause
*	Contact with molten substance may cause severe burns to ski	n and eyes.
*	Avoid any skin contact.	,
*	Effects of contact or inhalation may be delayed.	
*	Fire may produce irritating, corrosive and/or toxic gases.	d/or
	toxic and cause pollution.	u/01
FIRE	OR EXPLOSION	
*	Combustible material: may burn but does not ignite readily.	
*	When heated, vapors may form explosive mixtures with air: in	ndoors,
*	outdoors, and sewers explosion hazards.	ively when
	heated or involved in a fire.	
*	Contact with metals may evolve flammable hydrogen gas.	
*	Containers may explode when heated.	
*	Runoff may pollute waterways.	
* וסו וסו	Substance may be transported in a molten form.	
*	CALL Emergency Response Telephone Number on Shipping P	aner first. If
	Shipping Paper not available or no answer, refer to appropriat	e
	telephone number listed on the inside back cover.	
*	Isolate spill or leak area immediately for at least 25 to 50 met	ers
*	(80 to 160 feet) in all directions.	
*	Stay upwind	
*	Keep out of low areas.	
*	Ventilate enclosed areas.	
PROT	ECTIVE CLOTHING	
*	Wear positive pressure self-contained breathing apparatus (S	CBA).
	the manufacturer. It may provide little or no thermal protection	n
*	Structural firefighters' protective clothing provides limited	
	protection in fire situations ONLY; it is not effective in spill	
EVAC	situations.	
Spill	OATION	
*	See the Table of Initial Isolation and Protective Action Distance	tes for
	highlighted substances. For non-highlighted substances, increa	ase, in
	the downwind direction, as necessary, the isolation distance sl	nown
Fire		
*	If tank, rail car or tank truck is involved in a fire, ISOLATE for	
	800 meters (1/2 mile) in all directions; also, consider initial	
ENAET	evacuation for 800 meters (1/2 mile) in all directions.	
FIRE	Idenci Response	
Small	Fires	
*	Dry chemical, CO2 or water spray.	
Large	Fires	

- Dry chemical, CO2, alcohol-resistant foam or water spray. Move containers from fire area if you can do it without risk. Dike fire control water for later disposal; do not scatter the
- material.

Fire involving Tanks or Car/Trailer Loads

*	Fight fire from maximum distance or use unmanned hose holders or
	monitor nozzles.
*	Do not get water inside containers.
*	Cool containers with flooding quantities of water until well after
	fire is out
*	Withdraw immediately in case of rising sound from venting safety
	devices or discoloration of tank
*	Al WAYS stay away from tanks engulfed in fire
SPI	
*	EI MINATE all ignition sources (no smoking, flares, sparks or flames
	in immediate area)
*	Do not touch damaged containers or spilled material unless wearing
	anoropriate protective clothing.
*	Stop leak if you can do it without risk.
*	Prevent entry into waterways, sewers, basements or confined areas.
*	Absorb or cover with dry earth, sand or other non-combustible material
	and transfer to containers.
*	DO NOT GET WATER INSIDE CONTAINERS.
IFIR	RST AID
*	Move victim to fresh air.
*	Call 911 or emergency medical service.
*	Apply artificial respiration if victim is not breathing.
*	Do not use mouth-to-mouth method if victim ingested or inhaled the
	substance; induce artificial respiration with the aid of a pocket mask
	equipped with a one-way valve or other proper respiratory medical
	device.
*	Administer oxygen if breathing is difficult.
*	Remove and isolate contaminated clothing and shoes.
*	In case of contact with substance, immediately flush skin or eyes with
	running water for at least 20 minutes.
*	For minor skin contact, avoid spreading material on unaffected skin.
*	Keep victim warm and quiet.
*	Effects of exposure (inhalation, ingestion or skin contact) to
	substance may be delayed.
*	Ensure that medical personnel are aware of the material(s) involved.

and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: NA

Firefighting: NA

Reactivity: NA

First Aid: NA

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E () DEPART	MENT O)FLARO	R						SEARCH
Occupation	al Safety & I	Health Adm	inistration			A to 7 Index	En Español Co	ntact Us What'	s New About OSHA
Occupations			IIIISti attori			A to 2 muex			Silew About OSIA
OSHA Home						RSS Feeds	🖶 Print This Page	😑 🛨 Text Size	E-Mail This Page
OSHA/EPA Occup	ational C	hemical I	Database	е					
Chemical Identificat	tion								
Chemical Name: CHROM	IUM METAL		1750		Farmeria	C H			
CAS #: /440-4/-3	mium	UN NO:	1/59		Formula	: Cr			
Synonyms. chrome, chro	/mam								
Physical Properties								1	
Physical Description: B	ue-white to ste	eel-gray, lustro	ous, brittle, h	ard, odorless s	olid.]	
BP: 4788ºF	MW : 52.0		LEL: NA	NFPA Fire F	Rating: NA				
FRZ/MLT: MLT: 3452°F	VP: 0 mmHg	(approx)	UEL: NA	NFPA Healt	h Rating: NA				
FP: NA	VD: NA			NFPA Reac	tivity Rating: NA				
Sp. GR: 7.14	IP: NA			NFPA Sp. II	nst.: NA				
Exposure Limits									
OSHA		NIOSH			Related Informa	ition		1	
PEL-TWA ppm: NA		REL-TWA p	pm: NA		AIHA Emergency	y Response Pla	nning Guidelines		
PEL-TWA mg/m3: 1		REL-TWA m	ng/m3: 0.5		- ERPG-1/ERPG	-2/ERPG-3:			
PEL-STEL ppm: NA		REL-STEL p	pm: NA						
PEL-STEL mg/m3: NA		REL-STEL n	ng/m3: NA						
PEL-C ppm: NA		REL-C ppm	: NA						
PEL-C mg/m3: NA		REL-C mg/	m3: NA		Carcinogen Clas	sifications: IAR	C-3, TLV-A4	1	
Skin Notation: No		Skin Notati	on: No						
Notes: NA		Notes: NA							
		IDLH ppm:	NA						
		IDLH mg/n	n 3 : 250						
		IDLH Notes	s: NA						
					1			7	
NIOSH POCKET GUIC	ie to Chem	lical Hazar	as (Curre	ent through	June 2006)			_	
Chromium metal						CAS: 7440-47-3			
Formula: Cr						RTECS: GB4200	000	1	
Synonyms & Trade Names	: Chrome, Chr	omium				DOT ID & Guide	: NA	4	
Exposure Limits								4	
NIOSH REL: TWA 0.5 mg/	m3 See Appen	dix C		OSHA PEL*: T	WA 1 mg/m3 See A	ppendix C [*Not	e: The PEL also		
IDLH: 250 mg/m3 (as Cr)				Conversion: N	IA]		1	
Physical Description				1				1	
Blue-white to steel-gray, lu	ustrous, brittle,	, hard, odorles	s solid.					1	
MW: 52.0	BP: 4	788F		MLT: 3452F		Sol: Insoluble		1	
VP: 0 mmHg (approx)	IP: NA	4		RGasD: NA		Sp.Gr: 7.14		1	
FI.P: NA	UEL: I	NA		LEL: NA		MEC: NA		1	
Noncombustible Solid in bu	ulk form, but fi	inely divided d	lust burns rap	pidly if heated i	n a flame. (<u>See flan</u>	mable and comb	ustible liquid	1	
Incompatibilities & Rea	activities							-	
Strong oxidizers (such as l	nydrogen pero	xide), alkalis						-	
Measurement Methods	.,							1	
NIOSH 7024, 7300, 7301,	7303, 9102; 0	SHA ID121. I	D125G					1	
Personal Protection & S	Sanitation		•	First Aid				1	
Skin: N.R.				Eye: Irr imme	d			1	
Eyes: N.R.				Skin: Soap wa	ish .			1	
Wash skin: N.R. Remove: N.R				Breath: Resp	support ical attention immer	1			
Change: N.R.				(<u>See procedur</u>	<u>es</u>)	-		1	

STIA/EI A Occupational Chemical Database - Full Report	
NIOSH Respirator Recommendations	
NIOSH 2.5 mg/m3: DM* 5 mg/m3: DMXSQ*/SA* 12.5 mg/m3: SA:CF*/PAPRDM* 25 mg/m3: HiEF/PAPRTHiE*/SCBAF/SAF 250 mg/m3: SAE:PD.PP : SCBAE:PD.PP/SAE:PD.PP:ASCBA Escape: HiEF/SCBAE	:
(See symbols and codes)	
Exposure Routes	
Inh Ing Con	
Symptoms	
Irrit eyes, skin; lung fib (histologic)	
(See abbreviations)	—
(See abbreviations)	
DOT Emergency Response Guidebook (ERG 2004)	
Outlie Namehon 454	_
Guide Number: 154	
154 Substances - Toxic and/or Corrosive (Non-Combustible)	
POTENTIAL HAZARDS	
HEALTH	
* TOXIC; inhalation, ingestion, or skin contact with material may cause	
severe injury or deadu.	
 Avoid any skin contact. 	
* Effects of contact or inhalation may be delayed.	
* Fire may produce irritating, corrosive and/or toxic gases.	
* Runoff from fire control or dilution water may be corrosive and/or	
toxic and cause pollution.	
FIRE OR EXPLOSION	
* Non-compusible, substance itself does not burn but may decompose upon	
* Some are oxidizers and may ignite combustibles (wood, paper, oil.	
clothing, etc.).	
* Contact with metals may evolve flammable hydrogen gas.	
* Containers may explode when heated.	
PUBLIC SAFETY	
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- * CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.
- * Isolate spill or leak area immediately for at least 25 to 50 meters
- (80 to 160 feet) in all directions.
- * Keep unauthorized personnel away.
- * Stay upwind.
- Keep out of low areas.
- Ventilate enclosed areas.

PROTECTIVE CLOTHING

- * Wear positive pressure self-contained breathing apparatus (SCBA).
- * Wear chemical protective clothing which is specifically recommended by
- the manufacturer. It may provide little or no thermal protection.
 Structural firefighters' protective clothing provides limited protection in fire situations ONLY; it is not effective in spill

situations. EVACUATION

Spill

- See the Table of Initial Isolation and Protective Action Distances for highlighted substances. For non-highlighted substances, increase, in the downwind direction, as necessary, the isolation distance shown under **PUBLIC SAFETY**.
- Fire
- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE Small Fires

* Dry chemical, CO2 or water spray.

Large Fires

- ^{*} Dry chemical, CO2, alcohol-resistant foam or water spray.
- Move containers from fire area if you can do it without risk.
- Dike fire control water for later disposal; do not scatter the material.
- Fire involving Tanks or Car/Trailer Loads
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- * Do not get water inside containers.
- Cool containers with flooding quantities of water until well after fire is out.
- * Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.

SPILL OR LEAK

- * ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- * Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- * Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
 Absorb or cover with dry earth, sand or other non-combustible material
- and transfer to containers.
- * DO NOT GET WATER INSIDE CONTAINERS.

FIRST AID

- * Move victim to fresh air.
- * Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
 * Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- * Administer oxygen if breathing is difficult.
- * Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- * Keep victim warm and quiet.
- * Effects of exposure (inhalation, ingestion or skin contact) to
- substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: SMALL SPILLS AND LEAKAGE: If you spill this chemical, dampen the solid spill material with 5% ammonium hydroxide, then transfer the dampened material to a suitable container. Use absorbent paper dampened with 5% ammonium hydroxide to pick up any remaining material. Your contaminated clothing and the absorbent paper should be sealed in a vapor-tight plastic bag for eventual disposal. Wash all contaminated surfaces with 5% ammonium hydroxide followed by washing with a strong soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.STORAGE PRECAUTIONS: You should store this material in a refrigerator. (NTP, 1992)

Firefighting: NA

Reactivity: REACTIVITY: Reacts violently with NH4NO3, N2O2, Li, NO, KClO3, SO2. (NTP, 1992)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: Some heavy metals are VERY TOXIC POISONS, especially if their salts are very soluble in water (e.g., lead, chromium, mercury, bismuth, osmium, and arsenic). IMMEDIATELY call a hospital or poison control center and locate activated charcoal, egg whites, or milk in case the medical advisor recommends administering one of them. Also locate Ipecac syrup or a glass of salt water in case the medical advisor recommends inducing vomiting. Usually, this is NOT RECOMMENDED outside of a physician's care. If advice from a physician is not readily available and the victim is conscious and not convulsing, give the victim a glass of activated charcoal slurry in water or, if this is not available, a glass of milk, or beaten egg whites and IMMEDIATELY transport victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, assure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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03

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OSHA/EFA Occup	ational Chemica	I Database -	гип кероп				Fage 10
UNITED DEPART	STATES MENT OF LAB	OR				OL 🖲 OSHA	Advanced Search
Occupation	al Safety & Health A	dministration		A to Z Index	En Español Co	ntact Us What's	New About OSHA
OSHA Home			RSS Feeds	🖨 Print This Page	😑 🛨 Text Size	🐱 E-Mail This Page	
OSHA/EPA Occup	oational Chemica	al Database					
Chemical Identifica	tion Chi oride						
CAS #: 75-00-3	UN N Hydrochloric ether: Mor	No: 1037 Nochloroethane: M	For	mula: C2H5Cl			
	,, a. o co. o co. ,o.					-	
Physical Properties							
Physical Description: C gas.]	olorless gas or liquid (bel	ow 54ºF) with a p	ungent, ether-like odor. [N	ote: Shipped as a lique	efied compressed		
BP : 54ºF	MW: 64.5	LEL: 3.8%	NFPA Fire Rating: 4				
FRZ/MLT: FRZ: -218°F	VP : 1000 mmHg	UEL: 15.4%	NFPA Health Rating: 2				
FP : NA (Gas) -58ºF (Liquid)	VD: 2.23		NFPA Reactivity Rating	: 0			
Sp. GR: 0.92 (Liquid at 32°F)	IP: 10.97 eV		NFPA Sp. Inst.: NA				

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: 1000	REL-TWA ppm: NA	AIHA Emergency Response Planning Guidelines
PEL-TWA mg/m3: 2600	REL-TWA mg/m3: NA	- ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: IARC-3, TLV-A3
Skin Notation: No	Skin Notation: No	
Notes: NA	Notes: HANDLE WITH CAUTION	
	IDLH ppm: 3800	
	IDLH mg/m3: NA	
	IDLH Notes: 10% of LEL	

NIOSH Pocket Guide to Chemical Hazards (Current through June 2006)			
Ethyl chloride			CAS: 75-00-3
Formula: CH3CH2Cl			RTECS: KH7525000
Synonyms & Trade Names: Chlor	oethane, Hydrochloric ether, Monc	ochloroethane, Muriatic ether	DOT ID & Guide: 1037 115
Exposure Limits			
NIOSH REL: Handle with caution (Chloroethanes)	in the workplace. See Appendix C	OSHA PEL: TWA 1000 ppm (2600 mg/m3)	
IDLH: 3800 ppm [10%LEL]		Conversion: 1 ppm = 2.64 mg/r	m3
Physical Description			
Colorless gas or liquid (below 54	F) with a pungent, ether-like odor.	[Note: Shipped as a liquefied co	mpressed gas.]
MW: 64.5	BP: 54F	FRZ: -218F	Sol: 0.6%
VP: 1000 mmHg	IP: 10.97 eV	RGasD: 2.23	Sp.Gr: 0.92 (Liquid at 32F)
Fl.P: NA (Gas) -58F (Liquid)	UEL: 15.4%	LEL: 3.8%	MEC: NA
Flammable Gas (See flammable and combustible liquid classes)			
Incompatibilities & Reactivities			
Chemically-active metals such as sodium, potassium, calcium, powdered aluminum, zinc & magnesium; oxidizers; water or steam [Note: Reacts with water to form hydrochloric acid.]			
Measurement Methods			
NIOSH 2519			
Personal Protection & Sanita	tion	First Aid	
Skin: Prevent skin contact (liquid) Eyes: Prevent eye contact (liquid) Wash skin: N.R.		Eye: Irr immed (liquid) Skin: Water flush prompt (liquid) Breath: Resp support	

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=438

Page 1 of 3

Remove: When wet (flamm) Change: N.R.	Swallow: Medical attention immed (liquid) (<u>See procedures</u>)
NIOSH Respirator Recommendations	· · · ·
OSHA 3800 ppm: SA*/SCBAF : SCBAF:PD,PP/SAF:PD,PP:AS (See symbols and codes)	CBA Escape: GMFOV/SCBAE
Exposure Routes	
Inh Abs (liquid) Ing (liquid) Con	
Symptoms	
Inco, inebri; abdom cramps; card arrhy, card arrest; liver, k (<u>See abbreviations</u>)	idney damage
Target Organs	
Liver, kidneys, resp sys, CVS, CNS (See abbreviations)	
DOT Emergency Response Guidebook (ERG	G 2004)
Guide Number: 115	,
115 Gases - Flammable (Including Refrigerated Liqu POTENTIAL HAZARDS FIRE OR EXPLOSION * EXTREMELY FLAMMABLE. * Will be easily ignited by heat, sparks or flames. * Will form explosive mixtures with air. * Vapors from liquefied gas are initially heavier than air along ground. * Vapors may travel to source of ignition and flash back * Containers may explode when heated.	ids) and spread
 * Ruptured cylinders may rocket. HEALTH * Vapors may cause dizziness or asphyxiation without w * Some may be irritating if inhaled at high concentration * Contact with gas or liquefied gas may cause burns, see and/or frostbite. * Fire may produce irritating and/or toxic gases. 	varning. ns. evere injury
 PUBLIC SAFETY CALL Emergency Response Telephone Number on Shi Shipping Paper not available or no answer, refer to ap telephone number listed on the inside back cover. Isolate spill or leak area immediately for at least 50 to (160 to 330 feet) in all directions. Keep unauthorized personnel away. Stay unwind 	pping Paper first. If propriate 9 100 meters
 Many gases are heavier than air and will spread along collect in low or confined areas (sewers, basements, to Keep out of low areas. PROTECTIVE CLOTHING Wear positive pressure self-contained breathing appai Structural firefighters' protective clothing will only pro protection. 	j ground and anks). ratus (SCBA). vide limited
 Always wear thermal protective clothing when handlir refrigerated/cryogenic liquids. EVACUATION Large Spill Consider initial downwind evacuation for at least 800 (1/2 mile). 	ng meters
 If tank, rail car or tank truck is involved in a fire, ISOI 1600 meters (1 mile) in all directions; also, consider in evacuation for 1600 meters (1 mile) in all directions. EMERGENCY RESPONSE 	ATE for itial
* DO NOT EXTINGUISH A LEAKING GAS FIRE UNLESS Small Fires	LEAK CAN BE STOPPED.
 Dry chemical or CO2. Large Fires Water spray or fog. Move containers from fire area if you can do it without fire involving. 	t risk.
 Fight fire from maximum distance or use unmanned h monitor nozzles. Coll contributions with fire direction of the fire of th	nose holders or
 Cool containers with nooding quantities of water until fire is out. * Do not direct water at source of leak or safety devices 	weil alter 5; icing may
Vithdraw immediately in case of rising sound from ve dovices or discolaration of tank	nting safety
 ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monit 	tor nozzles; if this

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=438

is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- * All equipment used when handling the product must be grounded.
- * Do not touch or walk through spilled material.
- * Stop leak if you can do it without risk.
- * If possible, turn leaking containers so that gas escapes rather than liquid.
- * Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material.
- * Do not direct water at spill or source of leak.
- Prevent spreading of vapors through sewers, ventilation systems and confined areas.
- * Isolate area until gas has dispersed.
- CAUTION: When in contact with refrigerated/cryogenic liquids, many materials become brittle and are likely to break without warning.

FIRST AID

- * Move victim to fresh air.
- * Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- * Remove and isolate contaminated clothing and shoes.
- * Clothing frozen to the skin should be thawed before being removed.
- * In case of contact with liquefied gas, thaw frosted parts with
- lukewarm water
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may spread fire. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. (AAR, 1999)

Reactivity: STABILITY: This compound is heat sensitive.REACTIVITY: This compound will hydrolyze in the presence of alkalies and water. It reacts with water or steam to produce toxic and corrosive fumes. It can also react vigorously with oxidizing materials. The vapor forms highly flammable mixtures with air. A mixture of this compound with potassium is shock-sensitive. Contact with chemically active metals such as Na, K, Ca, powdered AI, Zn and Mg may result in violent reactions. (NTP, 1992)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: CAUTION: Exposure of skin to compressed gases may result in freezing of the skin. Treatment for frostbite may be necessary. Remove the victim from the source of contamination. IMMEDIATELY wash affected areas gently with COLD water (and soap, if necessary) while removing and isolating all contaminated clothing. Dry carefully with clean, soft towels. Call a hospital or poison control center IMMEDIATELY even if no symptoms (such as inflammation or irritation) develop. Be prepared to transport the victim to a hospital for treatment after washing the affected area if advised to do so by a physician. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: This compound is a gas, therefore inhalation is the first route of exposure. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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SHA/EPA Occupational Chemical Database - Full Report	Page 1 of
UNITED STATES	All DOL OSHA Advanced Search
🕑 DEPARTMENT OF LABOR	SEARCH
Occupational Safety & Health Administration	A to Z Index En Español Contact Us What's New About OSHA
OSHA Home	💦 RSS Feeds 🛛 🔠 Print This Page 🗧 🛨 Text Size 🛛 🖾 E-Mail This Page
OSHA/EPA Occupational Chemical Database	
Chemical Identification	
hemical Name: CARBON TETRACHLORIDE	
AS #: 56-23-5 UN No: 1846	Formula: CCl4
ynonyms: Carbon chloride; Carbon tet; Freon®10; Halon®104; Tetrachloromethane	
Physical Properties	
Physical Description: Colorless liquid with a characteristic ether-like odor.	
	<u></u>

OSHA/EP

Chemical I

Physical Properties				
Physical Description: Colorless liquid with a characteristic ether-like odor.				
BP: 170°F MW: 153.8 LEL: NA NFPA Fire Rating: 0				
FRZ/MLT: FRZ: -9°F	VP: 91 mmHg UEL: NA NFPA Health Rating: 3			
FP: NA	VD: NA		NFPA Reactivity Rating: 0	
p. GR: 1.59 IP: 11.47 eV NFPA Sp. Inst.: NA				

Exposure Limits			
OSHA	NIOSH	Related Information	
PEL-TWA ppm: 10	REL-TWA ppm: NA	AIHA Emergency Response Planning Guidelines	
PEL-TWA mg/m3: NA	REL-TWA mg/m3: NA	- ERPG-1/ERPG-2/ERPG-3:	
PEL-STEL ppm: NA	REL-STEL ppm: 2		
PEL-STEL mg/m3: NA	REL-STEL mg/m3: 12.6		
PEL-C ppm: 25	REL-C ppm: NA		
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: IARC-2B, NIOSH-Ca, NTP-R, TLV-A2	
Skin Notation: No	Skin Notation: No		
Notes: PEAK = 200 ppm FOR A 5 MINUTE INTERVAL DURING ANY 4 HOURS	Notes: CARCINOGEN (Ca); 60 MINUTE STEL		
	IDLH ppm: 200		
	IDLH mg/m3: NA]	
	IDLH Notes: Ca		

NIOSH Pocket Guide to Chemical Hazards (Current through June 2006)			
Carbon tetrachloride			CAS: 56-23-5
Formula: CCl4			RTECS: FG4900000
Synonyms & Trade Names: Carbo	on chloride, Carbon tet, Freon 10,	Halon 104, Tetrachloromethane	DOT ID & Guide: 1846 151
Exposure Limits			
NIOSH REL: Ca ST 2 ppm (12.6 mg/m3) [60-minute] See		OSHA PEL : TWA 10 ppm C 25 ppm 200 ppm (5-minute maximum peak in any 4 hours)	
IDLH: Ca [200 ppm]		Conversion: 1 ppm = 6.29 mg/m3	3
Physical Description			
Colorless liquid with a characteristic ether-like odor.			
MW: 153.8	BP: 170F	FRZ: -9F	Sol: 0.05%
VP: 91 mmHg	IP: 11.47 eV	RGasD: NA	Sp.Gr: 1.59
I.P: NA UEL: NA		LEL: NA	MEC: NA
Noncombustible Liquid (See flammable and combustible liquid classes)			
Incompatibilities & Reactivities			
Chemically-active metals such as sodium, potassium & magnesium; fluorine; aluminum [Note: Forms highly toxic phosgene gas when exposed to flames or welding arcs.]			
Measurement Methods			
NIOSH 1003; OSHA 7			
Personal Protection & Sanitat	tion	First Aid	
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam		Eye: Irr immed Skin: Soap wash immed Breath: Resp support Swallow: Medical attention immed	i

STAVEL A Occupational Chemical Database	
Change: N.R.	(See procedures)
Provide: Eyewash, Quick drench	
NIOSH Respirator Recommendations	
NIOSH : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE	
Exposure Routes	
Inh Abs Ing Con	
Symptoms	
Irrit eves, skin: CNS depres: nau, vomit: liver, kidnev ini: drow, di	zz. inco: [carc]
(See abbreviations)	,, <u>L</u>
Target Organs	
CNS, eyes, lungs, liver, kidneys, skin	
DOT Emergency Response Guidebook (ERG 200	(4)
Guide Number: 151	
151 Substances - Toxic (Non-Combustible)	
POTENTIAL HAZARDS	
HEALIH Highly toxic, may be fatal if inhaled, swallowed or absorbed	through
skin.	-
 Avoid any skin contact. Effects of contact or inhalation may be delayed 	
 Fire may produce irritating, corrosive and/or toxic gases. 	
 Runoff from fire control or dilution water may be corrosive a toxic and cause pollution 	and/or
FIRE OR EXPLOSION	
* Non-combustible, substance itself does not burn but may de	ecompose upon
* Containers may explode when heated.	
* Runoff may pollute waterways.	
PUBLIC SAFETY * CALL Emergency Response Telephone Number on Shipping	Paper first. If
Shipping Paper not available or no answer, refer to appropri-	ate
telephone number listed on the inside back cover.	eters
(80 to 160 feet) in all directions.	
 Keep unauthorized personnel away. Stay upwind 	
* Keep out of low areas.	
PROTECTIVE CLOTHING	20 2 4)
 Wear positive pressure self-contained breatning apparatus (Wear chemical protective clothing which is specifically recon 	SCBA). nmended by
the manufacturer. It may provide little or no thermal protect	ion.
 Structural firefighters' protective clothing provides limited protection in fire situations ONLY: it is not effective in spill 	
situations.	
EVACUATION Spill	
* See the Table of Initial Isolation and Protective Action Dista	nces for
highlighted substances. For non-highlighted substances, incr the downwind direction as necessary, the isolation distance	ease, in shown
under PUBLIC SAFETY.	Shown
Fire	~
800 meters (1/2 mile) in all directions; also, consider initial	
evacuation for 800 meters (1/2 mile) in all directions.	
FIRE	
Small Fires	
The provide the provided and the provide	
* Water spray, fog or regular foam.	
 Move containers from fire area if you can do it without risk. Dike fire control water for later disposal: do not scatter the 	
material.	
* Use water spray or fog; do not use straight streams. Fire involving Tanks or Car/Trailer Loads	
* Fight fire from maximum distance or use unmanned hose he	olders or
 monitor nozzles. * Do not get water inside containers 	
 Cool containers with flooding quantities of water until well a 	fter
fire is out.	fah /
devices or discoloration of tank.	Salery
* ALWAYS stay away from tanks engulfed in fire.	loo if this
For massive fire, use unmanned nose holders or monitor no is impossible, withdraw from area and let fire burn.	22ies; II นาเร

SPILL OR LEAK

- Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- * Stop leak if you can do it without risk.
- * Prevent entry into waterways, sewers, basements or confined areas.
- * Cover with plastic sheet to prevent spreading.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- * DO NOT GET WATER INSIDE CONTAINERS.

FIRST AID

- * Move victim to fresh air.
- * Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- * Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- * Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- * For minor skin contact, avoid spreading material on unaffected skin.
- * Keep victim warm and quiet.
- * Effects of exposure (inhalation, ingestion or skin contact) to
- substance may be delayed.
- * Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Apply water spray or mist to knock down vapors. Combustion products include corrosive or toxic vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash or cement powder. Apply "universal" gelling agent to immobilize spill. Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. Remove trapped material with suction hoses. If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999)

Firefighting: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) (AAR, 1999)

Reactivity: CHEMICAL PROFILE: A commonly used liquid in fire extinguishers to combat small fires. It has no flash point, it is not flammable. However, when heated to decomposition, it will emit fumes of extremely toxic phosgene and of hydrogen chloride. Forms explosive mixtures with chlorine trifluoride, calcium hypochlorite, decaborane, dinitrogen tetroxide, fluorine. Forms impact-sensitive explosive mixtures with particles of many metals: lithium, sodium, potassium, beryllium, zinc, aluminum, barium. Vigorous exothermic reaction with allyl alcohol, boron trifluoride, diborane, disilane, aluminum chloride, diberzoyl peroxide, potassium tert-butoxide, liquid oxygen, zirconium. [Bretherics, 5th ed., 1995, p. 666]. Potentially dangerous reaction with dimethylformamide or dimethylacetamide in presence of iron [Cardillo, P. et al., Ann. Chim. (Rome), 1984, 74, p. 129). (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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OSHA/EPA Occupational Chemical Database

Chemical Identification

Chemical Name: CADMIUM METAL AND COMPOUNDS, as Cd CAS #: 7440-43-9 UN No: Formula: Cd Synonyms: Cadmium metal: Cadmium. Other synonyms vary depending upon the specific cadmium compound

Physical Properties			
Physical Description: Metal: Silver-white, blue-tinged lustrous, odorless solid.			
BP : 1409ºF	PF MW: 112.4 LEL: NA NFPA Fire Rating: NA		
FRZ/MLT: MLT: 610°F	VP: NA	UEL: NA	NFPA Health Rating: NA
FP: NA	VD: NA		NFPA Reactivity Rating: NA
Sp. GR: 8.65 (metal)	IP: NA		NFPA Sp. Inst.: NA

Exposure Limits			
OSHA	NIOSH	Related Information	
PEL-TWA ppm: NA	REL-TWA ppm: NA	AIHA Emergency Response Planning Guidelines	
PEL-TWA mg/m3: 0.005	REL-TWA mg/m3: NA	- ERPG-1/ERPG-2/ERPG-3:	
PEL-STEL ppm: NA	REL-STEL ppm: NA		
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA]	
PEL-C ppm: NA	REL-C ppm: NA		
PEL-C mg/m3: NA REL-C mg/m3: NA		Carcinogen Classifications: IARC-1, NIOSH-Ca,	
Skin Notation: No	Skin Notation: No	NTP-K, OSHA-Ca, TLV-A2	
Notes: SEE 29 CFR 1910.1027, FOR OPERATIONS/SEGMENTS WHERE THE STANDARD IS STAYED/NOT IN EFFECT PEL'S ARE LOCATED IN 29 CFR 1910.1000 TABLE Z-2 (DUST: 8-HR TWA=0.2mg/m3, C=0.6mg/m3; FUME: 8-HR TWA=0.1mg/m3, C=0.3mg/m3)	Notes: CARCINOGEN (Ca); REDUCE EXPOSURE TO LOWEST FEASIBLE CONCENTRATION (LOQ 0.1 mg/m3)		
	IDLH ppm: NA]	
	IDLH mg/m3: 9]	
	IDLH Notes: Ca]	

NIOSH Pocket Guide to Chemical Hazards (Current through June 2006)				
Cadmium dust (as Cd) CAS: 7440-43-9			CAS: 7440-43-9	
Formula: Cd (metal)			RTECS: EU9800000 (metal)	
Synonyms & Trade Names: specific cadmium compound	Cadmium metal: Cadmium Other syno .	nyms vary depending upon the	DOT ID & Guide: 2570 154 (cadmium compound)	
Exposure Limits				
NIOSH REL*: Ca See Appendix A [*Note: The REL applies to all CoSHA PEL*: [1910.1027] TWA 0.005 mg/m3 [*Note: The PEL application of the compounds (as Cd).]			0.005 mg/m3 [*Note: The PEL applies Cd).]	
IDLH: Ca [9 mg/m3 (as Cd)]]	Conversion: NA		
Physical Description				
Metal: Silver-white, blue-ting	ged lustrous, odorless solid.			
MW: 112.4	BP: 1409F	MLT: 610F	Sol: Insoluble	
VP: 0 mmHg (approx)	IP: NA	RGasD: NA	Sp.Gr: 8.65 (metal)	
FI.P: NA	UEL: NA	LEL: NA	MEC: NA	
Metal: Noncombustible Solid	Metal: Noncombustible Solid in bulk form, but will burn in powder form. (See flammable and combustible liquid classes)			
Incompatibilities & Reactivities				
Strong oxidizers; elemental sulfur, selenium & tellurium				
Measurement Methods				
NIOSH 7048, 7300, 7301, 7303, 9102; OSHA ID121, ID125G, ID189, ID206				
Personal Protection & Sanitation First Aid				

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=170

SEARCH

Advanced Search

Skin	N.R.	Eve: Irr immed	
Eves:	N.R.	Skin: Soap wash	
Wash	skin: Daily	Breath: Resp support	
Remo	ove: N.R.	Swallow: Medical attention immed	
Chan	ge: Daily	(<u>See procedures</u>)	
NIO	SH Respirator Recommendations		
NIOS	H : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE		
(<u>See</u>	symbols and codes)		
Ехро	osure Routes		
Inh I	ng		
Sym	ptoms		
Pulm	edema, dysp, cough, chest tight, subs pain; head; chills,	musc aches; nau, vomit, diarr; anos, emphy, prot, mild anemia; [carc]	
Tard	et Organs		
Resp	svs. kidnevs. prostate. blood		
(<u>See</u>	abbreviations)		
D0	F Emergency Response Guidebook (ERG 2	004)	
Guid	e Number: 154		
164	Substances Taxis and (ar Corrective (Non Combus		
154 POTI	Substances - Toxic and/or Corrosive (Non-Combus		
HEA	LTH		
*	TOXIC; inhalation, ingestion, or skin contact with materia	al may cause	
*	severe injury or death.	o skin and eves	
*	Avoid any skin contact.		
*	Effects of contact or inhalation may be delayed.		
*	Fire may produce irritating, corrosive and/or toxic gases.		
^	Runoff from fire control or dilution water may be corrosiv	e and/or	
FIRE			
*	Non-combustible, substance itself does not burn but may	decompose upon	
	heating to produce corrosive and/or toxic fumes.		
*	Some are oxidizers and may ignite combustibles (wood,	paper, oil,	
*	clothing, etc.).		
*	Containers may explode when heated.		
PUB	LIC SAFETY		
*	CALL Emergency Response Telephone Number on Shippi	ng Paper first. If	
	Shipping Paper not available or no answer, refer to appro	priate	
*	Telephone number listed on the inside back cover.	meters	
-	(80 to 160 feet) in all directions.	meters	
*	Keep unauthorized personnel away.		
*	Stay upwind.		
*	Keep out of low areas.		
*	Ventilate enclosed areas.		
PRO	IECTIVE CLOTHING		
*	Wear chemical protective clothing which is specifically re-	ואט אטאן. commended by	
	the manufacturer. It may provide little or no thermal prot	ection.	
*	Structural firefighters' protective clothing provides limited		
	protection in fire situations ONLY; it is not effective in spi	1	
_	situations.		
	JUATION		
spill *	See the Table of Initial Isolation and Protoctive Action Di	stances for	
	highlighted substances. For non-highlighted substances	ncrease, in	
	the downwind direction, as necessary, the isolation distar	ice shown	
	under PUBLIC SAFETY.		
Fire			
*	It tank, rail car or tank truck is involved in a fire, ISOLAT	E for	
	ovu meters (1/2 mile) in all directions; also, consider initi evacuation for 800 meters (1/2 mile) in all directions	di	
EMF	RGENCY RESPONSE		
FIRE			
Smal	Fires		
*	Dry chemical, CO2 or water spray.		
Large	Fires		
*	Dry chemical, CO2, alcohol-resistant foam or water spray		
*	Move containers from fire area if you can do it without risk.		
Ľ	material.		
Fire i	nvolving Tanks or Car/Trailer Loads		
*	Fight fire from maximum distance or use unmanned hose	e holders or	

*

monitor nozzles. Do not get water inside containers.

- Cool containers with flooding guantities of water until well after fire is out. Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank. ALWAYS stay away from tanks engulfed in fire. SPILL OR LEAK ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. FIRST AID Move victim to fresh air. Call 911 or emergency medical service. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with
 - running water for at least 20 minutes.
 - For minor skin contact, avoid spreading material on unaffected skin.
 - Keep victim warm and quiet.
 - Effects of exposure (inhalation, ingestion or skin contact) to
 - substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: SMALL SPILLS AND LEAKAGE: If you spill this chemical, you should dampen the solid spill material with
water, then transfer the dampened material to a suitable container. Use absorbent paper dampened with water to pick up any remaining
material. Seal your contaminated clothing and the absorbent paper in a vapor-tight plastic bag for eventual disposal. Wash all
contaminated surfaces with a strong soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other
responsible person) has verified that the area has been properly cleaned.STORAGE PRECAUTIONS: You should keep this material in a
tightly-closed container under an inert atmosphere, and store it in a freezer. (NTP, 1992)

Firefighting: To extinguish a fire involving this chemical you may use a dry chemical, carbon dioxide, foam or halon extinguisher; a water spray may also be used. (NTP, 1992)

Reactivity: AIR AND WATER REACTIONS: Slowly oxidized by moist air to form cadmium oxide.CHEMICAL PROFILE: A violent explosion occurred 30 minutes after placement of a cadmium rod into hydrazoic acid (Mellor 8 Supp.2:50 1967). Fused ammonium nitrate with powdered metal often produces a violent explosive reaction. Reactivity similar to zinc. (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eves with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: Some heavy metals are VERY TOXIC POISONS, especially if their salts are very soluble in water (e.g., lead, chromium, mercury, bismuth, osmium, and arsenic). IMMEDIATELY call a hospital or poison control center and locate activated charcoal, egg whites, or milk in case the medical advisor recommends administering one of them. Also locate Ipecac syrup or a glass of salt water in case the medical advisor recommends inducing vomiting. Usually, this is NOT RECOMMENDED outside of a physician's care. If advice from a physician is not readily available and the victim is conscious and not convulsing, give the victim a glass of activated charcoal slurry in water or, if this is not available, a glass of milk, or beaten egg whites and IMMEDIATELY transport victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, assure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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www.OSHA.gov

JSHA/EPA Occupational Che	inical Database - Full Report				Page 1 of
UNITED STATES DEPARTMENT OF	LABOR			DL 💿 OSHA	Advanced Search
Occupational Safety & Hea	aith Administration	A to Z Index	En Espanol Con	tact Us What's	New About OSHA
OSHA Home		RSS Feeds	🖶 Print This Page	😑 🛨 Text Size	🖂 E-Mail This Page
OSHA/EPA Occupational Che	emical Database				
Chemical Identification					
Chemical Name: ETHYL METHYL KETONE					
CAS #: 78-93-3	UN No: 1193	Formula: C4H8O			
Synonyms: Ethyl methyl ketone; MEK; Meth	hyl acetone; Methyl ethyl ketone				

Physical Properties				
Physical Description: Co	lorless liquid with a moderat	ely sharp, frag	grant, mint- or acetone-like odor.	
BP: 175°F MW: 72.1 LEL: (200°F): NFPA Fire Rating: 3 1.4%				
FRZ/MLT: FRZ: -123°F VP: 78 mmHg UEL: (200°F): 11.4% NFPA Health Rating: 1				
FP: 16°F	VD: NA		NFPA Reactivity Rating: 0	
Sp. GR: 0.81	IP : 9.54 eV		NFPA Sp. Inst.: NA	

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: 200	REL-TWA ppm: 200	AIHA Emergency Response Planning Guidelines
PEL-TWA mg/m3: 590	REL-TWA mg/m3 : 590	- ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: 300	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: 885	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: NA
Skin Notation: No	Skin Notation: No	
Notes: NA	Notes: NA	
	IDLH ppm: 3000	
	IDLH mg/m3: NA	
	IDLH Notes: NA	

NIOSH Pocket Guide to Chemical Hazards (Current through June 2006)				
2-Butanone			CAS: 78-93-3	
Formula: CH3COCH2CH3			RTECS: EL6475000	
Synonyms & Trade Names	: Ethyl methyl ketone, MEK, Methyl a	cetone, Methyl ethyl ketone	DOT ID & Guide: 1232 127	
Exposure Limits				
NIOSH REL: TWA 200 ppm mg/m3)	n (590 mg/m3) ST 300 ppm (885	OSHA PEL : TWA 200 ppm (590 mg/m3)	
IDLH: 3000 ppm		Conversion: 1 ppm = 2.95 m	ng/m3	
Physical Description				
Colorless liquid with a mod	lerately sharp, fragrant, mint- or acet	one-like odor.		
MW: 72.1	BP: 175F	FRZ: -123F Sol: 28%		
VP: 78 mmHg	IP: 9.54 eV	RGasD: NA	Sp.Gr: 0.81	
Fl.P: 16F UEL(200F): 11.4% LEL(200F): 1.44		LEL(200F): 1.4%	MEC: NA	
Class IB Flammable Liquid	(See flammable and combustible liqu	<u>iid classes</u>)		
Incompatibilities & Rea	ctivities			
Strong oxidizers, amines, a	ammonia, inorganic acids, caustics, is	ocyanates, pyridines		
Measurement Methods				
NIOSH 2500, 2555, 3800; OSHA 16, 84, 1004				
Personal Protection & Sanitation First Aid				
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam		Eye: Irr immed Skin: Water wash immed Breath: Fresh air		

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=64

Remove: When wet (flamm) Change: N.R.	Swallow: Medical attention immed (See procedures)
Provide: Eyewash	
NIOSH Respirator Recommendations	
NIOSH/OSHA 3000 ppm: SA:CF/PAPROV/CC (See symbols and codes)	RFOV/GMFOV/SCBAF/SAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE
Exposure Routes	
Inh Ing Con	
Sumatoms	
(<u>See abbreviations</u>)	m
Target Organs	
Eyes, skin, resp sys, CNS (See abbreviations)	
DOT Emorgonov Dochonco Cuid	abaak (EBC 2004)
DOT Emergency Response Guide	edook (ERG 2004)
Guide Number: 127	
127 Flammable Liquids (Polar/Water-M POTENTIAL HAZARDS FIRE OR EXPLOSION * HIGHLY FLAMMABLE: Will be easily ign * Vapors may form explosive mixtures w * Vapors may travel to source of ignition	<i>f</i> liscible) nited by heat, sparks or flames. vith air. n and flash back.
 Most vapors are heavier than air. They collect in low or confined areas (convert 	y will spread along ground and
 * Vapor explosion hazard indoors outdo 	or in sewers.
 * Those substances designated with a P 	may polymerize explosively when
heated or involved in a fire.	
 Runoff to sewer may create fire or exp 	plosion hazard.
 Containers may explode when heated. 	
* Many liquids are lighter than water.	
HEALTH * Inhalation or contact with material ma	av irritate or hurn skin and eves
 Fire may produce irritating, corrosive a 	and/or toxic gases.
 Vapors may cause dizziness or suffoca 	ation.
 Runoff from fire control may cause pol 	illution.
PUBLIC SAFETY	
 CALL Emergency Response Telephone Shipping Paper not available or no ansi telephone number listed on the inside l 	Number on Shipping Paper first. If wer, refer to appropriate back cover.
 Isolate spill or leak area immediately for (80 to 160 feet) in all directions 	or at least 25 to 50 meters
* Keep unauthorized personnel away.	
* Stay upwind.	
 Keep out of low areas. 	
 Ventilate closed spaces before entering 	g.
PROTECTIVE CLOTHING	headthing approximite (CCDA)
 * Wear positive pressure self-contained * Structural firefighters' protective clothin 	ing will only provide limited
EVACUATION	
Large Spill	
 Consider initial downwind evacuation f (1000 feet) 	for at least 300 meters
Fire	
* If tank, rail car or tank truck is involve	ed in a fire, ISOLATE for
800 meters (1/2 mile) in all directions;	also, consider initial
evacuation for 800 meters (1/2 mile) ir	n all directions.
EMERGENCY RESPONSE	
CAUTION: All these products have a very low	w flash point: Lise of water sprav
when fighting fire may be inefficient	w hash point. Use of water spray
Small Fires	
* Dry chemical, CO2, water spray or alco	ohol-resistant foam.
Large Fires	
* Water spray, fog or alcohol-resistant fo	oam.
 Use water spray or fog; do not use str Maya containing form form 	raight streams.
 Move containers from fire area if you of Eiro involving Tapks or Car/Tapilor Load 	can do it without risk.
 Fight fire from maximum distance or u 	use unmanned hose holders or
monitor nozzles.Cool containers with flooding quantities	es of water until well after
fire is out.	a sound from venting safety
devices or discoloration of tank.	

is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- * ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- * All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- * Stop leak if you can do it without risk.
- * Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- * Use clean non-sparking tools to collect absorbed material.

Large Spills

- * Dike far ahead of liquid spill for later disposal.
- * Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- * Move victim to fresh air.
- * Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- * Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
 In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- * Wash skin with soap and water.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to disperse vapors and dilute standing pools of liquid. Apply water spray or mist to knock down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Water spill: Use natural barriers or oil spill control booms to limit spill travel. Remove trapped material with suction hoses. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use "alcohol" foam, dry chemical or carbon dioxide. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Colorless liquid, moderately toxic, highly flammable. Explosive in the form of vapor when exposed to heat, flame or sparks. Ignition on contact with potassium tert-butoxide. Mixture with 2-propanol will form explosive peroxides during storage. Vigorous reaction with chloroform in the presence of alkali (sodium hydroxide, potassium hydroxide), chlorosulfonic acid, fuming sulfuric acid (oleum) [Lewis, 3rd ed., 1993, p. 855]. Reaction with hydrogen peroxide in the presence of nitric acid forms heat- and shock-sensitive explosive acetone peroxides. [Bjorklund, G. H. et al., Trans. R. Soc. Can, 1950, 44, p. 25]. (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY chansport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

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Formula: C4H100

Chemical Identification Chemical Name: SEC-BUTYL ALCOHOL CAS #: 78-92-2 UN No: 1993

Synonyms: 2-Butanol; Butylene hydrate; 2-Hydroxybutane; Methyl ethyl carbinol

Physical Properties Physical Description: Colorless liquid with a strong, pleasant odor. LEL: **BP**: 211ºF MW: 74.1 (212°F): NFPA Fire Rating: 3 1.7% UEL: FRZ/MLT: FRZ: -175°F VP: 12 mmHg (212°F): NFPA Health Rating: 1 9.8% FP: 75°F VD: NA NFPA Reactivity Rating: 0 Sp. GR: 0.81 IP: 10.10 eV NFPA Sp. Inst.: NA

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: 150	REL-TWA ppm: 100	AIHA Emergency Response Planning Guidelines
PEL-TWA mg/m3: 450	REL-TWA mg/m3: 305	- ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: 150	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: 455	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: NA
Skin Notation: No	Skin Notation: No	
Notes: NA	Notes: NA	
	IDLH ppm: 2000	
	IDLH mg/m3: NA	
	IDLH Notes: NA	

NIOSH Pocket Guide to Chemical Hazards (Current through June 2006)					
sec-Butyl alcoh	CAS: 78-92-2				
Formula: CH3CH(OH)C	H2CH3		RTECS: EO1750000		
Synonyms & Trade Na	mes: 2-Butanol, Butylene hydrate, 2-Hydr	oxybutane, Methyl ethyl carbinol	DOT ID & Guide: 1120 129		
Exposure Limits					
NIOSH REL: TWA 100 mg/m3)	ppm (305 mg/m3) ST 150 ppm (455	OSHA PEL : TWA 150 ppm (45	0 mg/m3)		
IDLH: 2000 ppm		Conversion: 1 ppm = 3.03 mg/	′m3		
Physical Description					
Colorless liquid with a	strong, pleasant odor.				
MW: 74.1	BP: 211F	FRZ: -175F	Sol: 16%		
VP: 12 mmHg	IP: 10.10 eV	RGasD: NA	Sp.Gr: 0.81		
Fl.P: 75F	UEL(212F): 9.8%	LEL(212F): 1.7%	MEC: NA		
Class IC Flammable Lic	quid (See flammable and combustible liqu	id classes)			
Incompatibilities &	Reactivities				
Strong oxidizers, orgar	ic peroxides, perchloric & permonosulfuri	ic acids			
Measurement Metho	Measurement Methods				
NIOSH 1405, 1450; OSHA 7					
Personal Protection & Sanitation First Aid					
Skin: Prevent skin contactEye: Irr immedEyes: Prevent eye contactSkin: Water flush promptWash skin: When contamBreath: Resp support					

Remove: When wet (flamm) Change: N.R.	Swallow: Medical attention immed (See procedures)
NIOSH Respirator Recommendations	
NIOSH/OSHA 1000 ppm: CCROV*/SA* 2000 ppm: SA Escape: GMFOV/SCBAE (See symbols and codes)	::CF*/PAPROV*/CCRFOV/GMFOV/SCBAF/SAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA
Exposure Routes	
Inh Ing Con	
Symptoms	
Irrit eves skin nose throat: narco	
(See abbreviations)	
Target Organs	
Eves, skin, resp svs. CNS	
(See abbreviations)	
	(50.0.2004)
DOT Emergency Response Guidebook	(ERG 2004)
Guide Number: 128	
128 Flammable Liquids (Non-Polar/Water-Imn	niscible)
POTENTIAL HAZARDS	
 HIGHLY FLAMMABLE: Will be easily ignited by I Vanors may form explosive mixtures with air 	leat, sparks or flames.
 * Vapors may travel to source of ignition and flas 	h back.
* Most vapors are heavier than air. They will spre	ead along ground and
collect in low or confined areas (sewers, basem	ents, tanks).
 vapor explosion nazard indoors, outdoors or in Those substances designated with a P may poly 	sewers. vmerize explosively when
heated or involved in a fire.	
 Runoff to sewer may create fire or explosion has 	azard.
 Containers may explode when heated. Many liquide are lighter than water. 	
Many liquids are lighter than water. Substance may be transported hot.	
HEALTH	
 Inhalation or contact with material may irritate 	or burn skin and eyes.
 Fire may produce irritating, corrosive and/or to Vapore may cause distinged or suffection 	xic gases.
 Runoff from fire control or dilution water may contro	ause pollution.
PUBLIC SAFETY	
 CALL Emergency Response Telephone Number Shipping Paper not available or no answer, refet telephone number listed on the inside back court 	on Shipping Paper first. If r to appropriate
 Isolate spill or leak area immediately for at least 	t 25 to 50 meters
(80 to 160 feet) in all directions.	
 Keep unauthorized personnel away. Characterized 	
 Stay upwind. Keen out of low areas 	
* Ventilate closed spaces before entering.	
PROTECTIVE CLOTHING	
 Wear positive pressure self-contained breathing Structural firefighters' protective clothing will open and the self-contained breathing 	j apparatus (SCBA). alv provide limited
protection.	ny provide infliced
EVACUATION	
Large Spill	
 Consider initial downwind evacuation for at lease (1000 feet) 	st 300 meters
Fire	
If tank, rail car or tank truck is involved in a fire 800 meters (1/2 mile) in all directions; also, cor	e, ISOLATE for Isider initial
evacuation for 800 meters (1/2 mile) in all direc	tions.
FIRE	
CAUTION: All these products have a very low flash po when fighting fire may be inefficient.	pint: Use of water spray
Small Fires * Dry chemical CO2 water spray or regular foon	n
Large Fires	
* Water spray, fog or regular foam.	
 Use water spray or fog; do not use straight stre Mayo containing for a first of the straight street. 	eams.
Move containers from fire area if you can do it Fire involving Tanks or Car/Trailer Loads	without risk.
Fight fire from maximum distance or use unma	nned hose holders or
monitor nozzles.	
* Cool containers with flooding quantities of wate fire is out.	er until well after
Withdraw immediately in case of rising sound f devices or discoloration of tank.	rom venting safety

* ALWAYS stay away from tanks engulfed in fire.

For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. SPILL OR LEAK ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Large Spills Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. FIRST AID Move victim to fresh air. Call 911 or emergency medical service. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. (AAR, 1999) Firefighting: Solid streams of water may be ineffective. Use "alcohol" foam, dry chemical or carbon dioxide. Cool all affected containers with flooding quantities of water. Do not use water. Keep run-off water out of sewers and water sources. (AAR, 1999) Reactivity: CHEMICAL PROFILE: Attacks plastics. (Handling Chemicals Safely 1980. p. 236). Acetyl bromide reacts violently with alcohols or water (Merck 11th ed. 1989). Mixtures of alcohols with concentrated sulfuric acid and strong hydrogen peroxide can cause explosions. Example: An explosion will occur if dimethylbenzylcarbinol is added to 90% hydrogen peroxide then acidified with concentrated sulfuric acid. Mixtures of ethyl alcohol with concentrated hydrogen peroxide form powerful explosives. Mixtures of hydrogen peroxide and 1phenyl-2-methyl propyl alcohol tend to explode if acidified with 70% sulfuric acid (Chem. Eng. News 45(43):73 1967; J, Org. Chem. 28:1893 1963). Alkyl hypochlorites are violently explosive. They are readily obtained by reacting hypochlorous acid and alcohols either in aqueous solution or mixed aqueous-carbon tetrachloride solutions. Chlorine plus alcohols would similarly yield alkyl hypochlorites. They decompose in the cold and explode on exposure to sunlight or heat. Tertiary hypochlorites are less unstable than secondary or primary hypochlorites (NFPA 491 M 1991). Base-catalysed reactions of isocyanates with alcohols should be carried out in inert solvents. Such reactions in the absence of solvents often occur with explosive violence (Wischmeyer 1969). (REACTIVITY, 1999) First Aid: Eye: If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. Skin: If this chemical contacts the skin, flush the contaminated skin with water promptly. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water promptly. If irritation persists after washing, get medical attention. Breathing: If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouthto-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible. Swallow: If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1997)

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OSHA/EPA Occupational Chemical Database

Chemical Identification

 Chemical Name: BERYLLIUM METAL AND COMPOUNDS, as Be

 CAS #: 7440-41-7
 UN No: 1567
 Formula: Be

 Synonyms: Beryllium metal: Beryllium Other synonyms vary depending upon the specific beryllium compound.

Physical Properties				
Physical Description: Me	etal: A hard, brittle, gray-wh	ite solid.		
BP : 4532ºF	MW : 9.0	LEL: NA	NFPA Fire Rating: 1	
FRZ/MLT: MLT: 2349°F VP: NA UEL: 2349°F NFPA Health Rating: 3				
FP: NA	VD: NA NFPA Reactivity Rating: 0			
p. GR: 1.85 (metal) IP: NA NFPA Sp. Inst.: NA				

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: NA	REL-TWA ppm: NA	AIHA Emergency Response Planning Guidelines
PEL-TWA mg/m3: 0.002	REL-TWA mg/m3: NA	- ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: 0.025	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: 0.005	REL-C mg/m3: 0.0005	Carcinogen Classifications: IARC-1, NIOSH-Ca,
Skin Notation: No	Skin Notation: No	NTP-K, TLV-A1
Notes: PEAK = 0.025 mg/m3 FOR 30 MINUTES DURING AN 8-HOUR SHIFT	Notes: CARCINOGEN (Ca)	
	IDLH ppm: NA	
	IDLH mg/m3: 4	
	IDLH Notes: Ca	

NIOSH Pocket Guide to	Chemical Hazards (Cur	rent through June 2006)		
Beryllium & beryllium compounds (as Be) CAS: 7440-41-7				
Formula: Be (metal)			RTECS: DS1750000 (metal)	
Synonyms & Trade Names: Bery specific beryllium compound.	/llium metal: Beryllium Other syn	onyms vary depending upon the	DOT ID & Guide: 1566 154 (compounds) 1567 134 (powder)	
Exposure Limits				
NIOSH REL: Ca Not to exceed 0	.0005 mg/m3 See Appendix A	OSHA PEL: TWA 0.002 mg/m3 minute maximum peak]	C 0.005 mg/m3 0.025 mg/m3 [30-	
IDLH: Ca [4 mg/m3 (as Be)]		Conversion: NA		
Physical Description				
Metal: A hard, brittle, gray-whit	e solid.			
MW: 9.0	BP: 4532F	MLT: 2349F	Sol: Insoluble	
VP: 0 mmHg (approx)	IP: NA	RGasD: NA	Sp.Gr: 1.85 (metal)	
FI.P: NA	FI.P: NA UEL: NA LEL: NA ME			
Metal: Noncombustible Solid in liquid classes)	bulk form, but a slight explosion	hazard in the form of a powder or o	dust. (See flammable and combustible	
Incompatibilities & Reactivi	ties			
Acids, caustics, chlorinated hydr	ocarbons, oxidizers, molten lithiu	m		
Measurement Methods				
NIOSH 7102, 7300, 7301, 7303, 9102; OSHA ID125G, ID206				
Personal Protection & Sanitation First Aid				
Skin: Prevent skin contact Eye: Irr immed Eyes: Prevent eye contact Breath: Fresh air Wash skin: Daily Image: State				

Advanced Search

Remove: When wet or contam	(See procedures)
Provide: Eyewash	
NIOSH Respirator Recommendations	
NIOSH : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: HiEF/SCBAE	
(See symbols and codes)	
Exposure Routes	
Inh Con	
Symptoms	
Berylliosis (chronic exposure): anor, low-wgt, weak, chest pain, co [carc]	ugh, clubbing of fingers, cyan, pulm insufficiency; irrit eyes; derm;
(<u>See abbreviations</u>)	
Fives skin resp svs	
(See abbreviations)	
DOT Emergency Response Guidebook (ERG 200)4)
Guide Number: 134	
134 Flammable Solids - Toxic and/or Corrosive	
POTENTIAL HAZARDS	
* Flammable/combustible material.	
 May be ignited by heat, sparks or flames. When heated wapers may form explosive mixtures with air: 	indeers
outdoors, and sewers explosion hazards.	1100015,
* Contact with metals may evolve flammable hydrogen gas.	
 Containers may explode when heated. HEALTH 	
* TOXIC; inhalation, ingestion, or skin contact with material n	nay cause
 severe injury or death. Fire will produce irritating corrosive and/or toxic cases 	
 Runoff from fire control or dilution water may be corrosive a 	and/or
toxic and cause pollution.	
* CALL Emergency Response Telephone Number on Shipping	Paper first. If
Shipping Paper not available or no answer, refer to appropri-	ate
 telephone number listed on the inside back cover. * Isolate spill or leak area immediately for at least 25 to 50 m 	eters
(80 to 160 feet) in all directions.	
 Stay upwind. Keep upauthorized personnel away 	
* Keep out of low areas.	
* Ventilate enclosed areas.	
* Wear positive pressure self-contained breathing apparatus (SCBA).
* Wear chemical protective clothing which is specifically recorr the manufacturer. It may provide little or no thermal protect	nmended by
 Structural firefighters' protective clothing provides limited 	
protection in fire situations ONLY; it is not effective in spill	
situations.	
Large Spill	
 Consider initial downwind evacuation for at least 100 meters (330 feet) 	5
Fire	
If tank, rail car or tank truck is involved in a fire, ISOLATE for 200 meters (1/2 mile) in all directions: also, capacider initial	or
evacuation for 800 meters (1/2 mile) in all directions.	
EMERGENCY RESPONSE	
Small Fires	
* Dry chemical, CO2, water spray or alcohol-resistant foam.	
Large Fires * Water spray, fog or alcohol-resistant foam	
* Move containers from fire area if you can do it without risk.	
 Use water spray or fog; do not use straight streams. 	
 Dike fire control water for later disposal; do not scatter the 	
material.	
Fire involving Tanks or Car/Trailer Loads * Fight fire from maximum distance or use unmanned base by	olders or
monitor nozzles.	
 Cool containers with flooding quantities of water until well a fire is out 	fter
 Withdraw immediately in case of rising sound from venting 	safety
devices or discoloration of tank.	
 * ALWAYS stay away from tanks engulfed in fire. 	

SPILL OR LEAK

- Fully encapsulating, vapor protective clothing should be worn for spills and leaks with no fire.
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- * Stop leak if you can do it without risk.
- * Do not touch damaged containers or spilled material unless wearing appropriate protective clothing.
- Prevent entry into waterways, sewers, basements or confined areas.
 Use clean non-sparking tools to collect material and place it into
- loosley covered plastic containers for later disposal.

FIRST AID

- * Move victim to fresh air.
- * Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
 Do not use mouth to mouth method if victim indested
- * Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device.
- * Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
- * Keep victim warm and quiet.
- * Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Apply water spray or mist to knock down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Water spill: Use natural barriers or oil spill control booms to limit spill travel. Remove trapped material with suction hoses. (AAR, 1999)

Firefighting: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Use water in flooding quantities as fog. Use foam, dry chemical, or carbon dioxide. Keep run-off water out of sewers and water sources. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Boron trifluoride reacts with incandescence when heated with alkali metals or alkaline earth metals except magnesium (Merck 11th ed. 1989). Finely divided or amalgamated metal reacts with HCl, dil HNO3, or dil H2SO4; attacked by strong base with evolution of hydrogen gas (Merck 11th ed. 1989). It has been determined experimentally that a mixture of beryllium powder with carbon tetrachloride or with trichloroethylene will flash or spark on heavy impact (ASESB Pot. Incid. 39 1968). The reaction between beryllium and the vapors of phosphorus proceeds with incandescence (Mellor 8:842 1946-47). (REACTIVITY, 1999)

First Aid: Eye: If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. Breathing: If a person breaths large amounts of this chemical, move the exposed person to fresh air at once. Other measures are usually unnecessary. (NIOSH, 1997)

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Page 1 of 3

	STATES		D				All D	OL 💽 OSHA	Advanced Search
	al Safety & I	Health Adm	inistration			A to 7 Index	En Español Cor	ntact Us What's	New About OSHA
occupation		icaliti / am	inioti attori						_
OSHA Home						RSS Feeds	🖶 Print This Page	😑 🕂 Text Size	🖂 E-Mail This Page
OSHA/EPA Occup	oational C	hemical I	Database	е					
Chamical Identifier	tion								
	tion								
	NE		1114		Formula				
CAS #: /1-43-2 Synonyms: Benzol: Phen	vl hvdride	UN NO:	1114		Formula				
Synonyms. Denzor, rhen	yr nyunuc								
Physical Properties]	
Physical Description: C	colorless to light	-yellow liquid	with an aron	natic odor. [No	te: A solid below 42	ºF.]		-	
BP: 176ºF	MW: 78.1		LEL: 1.2%	NFPA Fire F	Rating: 3			4	
FRZ/MLT: FRZ: 42ºF	VP : 75 mmH	g	UEL: 7.8%	NFPA Healt	th Rating: 2			4	
FP: 12°F	VD: NA		-	NFPA Reac	tivity Rating: 0			-	
Sp. GR: 0.88	IP : 9.24 eV			NFPA Sp. I	nst.: NA			J	
Exposure Limits								1	
					Polatod Inform	tion		-	
			nm : 0.1				nning Cuidolinos	-	
PEL-TWA ppili. 1 PEL-TWA mg/m3: NA		DEL-TWA P	pm. 0.1		- ERPG-1/ERPG	-2/ERPG-3:	inning Guidennes	,	
PEL-TWA Ing/IIIS. NA		DEL-STEL n	nm· 1		50 ppm/150 ppm/1000 ppm				
PEL-STEL ppm: 5		DEL-STEL P			-				
PEL-STEE mg/ms. NA			- ΝΔ		-				
PEL-C ppIII. NA		PEL-C mg/	m3·ΝΔ		Carcinogen Clas	sifications: IAP	C-1 NIOSH-Ca	-	
Skin Notation: No		Skin Notati	on: No		NTP-K, OSHA-Ca,	TLV-A1			
Notes: SEE 29 CFR 1910. INDUSTRIES EXEMPT FRO STANDARD THE PELS ARE 29 CFR 1910.1000 TABLE TWA=10 ppm, C=25ppm, FOR A 10 MINUTE INTER AN 8-HOUR SHIFT)	.1028, FOR DM THIS E LOCATED IN Z-2 (8-HR , PEAK=50ppm VAL DURING	Notes: CAR(CINOGEN (Ca	a)	-				
		IDLH ppm:	500		1				
		IDLH mg/m	13: NA						
		IDLH Notes	: Ca		1				
								-	
NIOSH Pocket Guid	de to Chem	ical Hazar	ds (Curre	ent through	June 2006)				
Benzene						CAS: 71-43-2		1	
Formula: C6H6						RTECS: CY1400	000	1	
Synonyms & Trade Names	s: Benzol, Phen	yl hydride				DOT ID & Guide	e: 1114 130		
Exposure Limits						•			
NIOSH REL: Ca TWA 0.1	ppm ST 1 ppm	See Appendix	А	OSHA PEL: [19	910.1028] TWA 1 pp	om ST 5 ppm See	e Appendix F]	
IDLH: Ca [500 ppm]	LH: Ca [500 ppm] Conversion: 1 ppm = 3.			ppm = 3.19 mg/m3	1]		
Physical Description									
Colorless to light-yellow lie	quid with an ar	omatic odor. [Note: A solid	below 42F.]		~			
MW: 78.1	BP: 17	6F		-RZ: 42F Sol: 0.07%					
VP: 75 mmHg	IP: 9.2	4 eV		(GasD: NA Sp.Gr: 0.88					
Fl.P: 12F	UEL: 7	.8%		LEL: 1.2%		MEC: NA		1	
Class IB Flammable Liquid	l (<u>See flammab</u>	le and combu	stible liquid c	classes)					
Incompatibilities & Rea	activities							1	
Strong oxidizers, many flu	orides & perch	lorates, nitric a	acid						
Measurement Methods	;							1	
NIOSH 1500, 1501, 3700,	3800; OSHA 1	2, 1005						1	
Personal Protection &	Sanitation			First Aid				1	
Skin: Prevent skin contact Eyes: Prevent eye contact	:			Eye: Irr immeo Skin: Soap was	d sh immed				
II.				l				l	

Wash skin: When contam	Breath: Resp support			
Remove: When wet (flamm)	Swallow: Medical attention immed			
Change: N.R.	(See procedures)			
Provide: Eyewash, Quick drench				
NIOSH Respirator Recommendations				
NIOSH : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE				
(See symbols and codes)				
Exposure Routes				
Inh Abs Ing Con				
Symptoms				
Irrit eyes, skin, nose, resp sys; gidd; head, nau, staggered gait; ftg	, anor, lass; derm; bone marrow depres; [carc]			
(See abbreviations)				
Target Organs				
Eyes, skin, resp sys, blood, CNS, bone marrow				
(<u>See abbreviations</u>)				
DOT Emergency Response Guidebook (ERG 2004	4)			
Guide Number: 130	,			
130 Flammable Liquids (Non-Polar/Water-Immiscible/Nox	tious)			
POTENTIAL HAZARDS				
FIRE OR EXPLOSION	r flamor			
 Vapors may form explosive mixtures with air. 	names.			
* Vapors may travel to source of ignition and flash back.				
* Most vapors are heavier than air. They will spread along grou	und and			
 collect in low or confined areas (sewers, basements, tanks). Yapor explosion bazard indoors, outdoors or in sewers 				
 * Those substances designated with a P may polymerize explo 	sively when			
heated or involved in a fire.				
 Runoff to sewer may create fire or explosion hazard. Containers may explode when heated 				
 Many liquids are lighter than water. 				
HEALTH				
* May cause toxic effects if inhaled or absorbed through skin.				
 Innalation or contact with material may irritate or burn skin a Fire will produce irritating corrosive and/or toxic gases 	and eyes.			
 * Vapors may cause dizziness or suffocation. 				
* Runoff from fire control or dilution water may cause pollution	ı.			
PUBLIC SAFETY	Demonsfront If			
Shipping Paper not available or no answer refer to appropria	te			
telephone number listed on the inside back cover.				
 Isolate spill or leak area immediately for at least 50 to 100 m 	neters			
(160 to 330 feet) in all directions.				
* Stay upwind.				
* Keep out of low areas.				
* Ventilate closed spaces before entering.				
* Wear positive pressure self-contained breathing apparatus (S	SCBA).			
* Structural firefighters' protective clothing will only provide lin	nited			
protection.				
* Consider initial downwind evacuation for at least 300 meters				
(1000 feet).				
Fire				
800 meters (1/2 mile) in all directions: also, consider initial				
evacuation for 800 meters (1/2 mile) in all directions.				
EMERGENCY RESPONSE				
FIRE	ater sprav			
when fighting fire may be inefficient.				
Small Fires				
* Dry chemical, CO2, water spray or regular foam.				
Large Fires * Water spray, fog or regular foam.				
* Do not use straight streams.				
* Move containers from fire area if you can do it without risk.				
Fire involving Tanks or Car/Trailer Loads				
 Fight fire from maximum distance or use unmanned hose holders or monitor nozzles. 				
* Cool containers with flooding quantities of water until well after				
fire is out.				
wutuuraw immediately in case or rising sound from venting safety devices or discoloration of tank.				
* ALWAYS stay away from tanks engulfed in fire.				
r				

For massive fire, use unmanned hose holders or monitor nozzles; if this

is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Large Spills Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. FIRST AID Move victim to fresh air. Call 911 or emergency medical service. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. (AAR, 1999) Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may spread fire. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. (AAR, 1999) Reactivity: CHEMICAL PROFILE: Allyl chloride or other alkyl halides will react vigorously with benzene or toluene, even at minus 70C. in the presence of ethyl aluminum dichloride or ethyl aluminum sesquichloride. Explosions have been reported (NFPA 491M 1991). Benzene ignites in contact with the powdered chromic anhydride (Mellor 11:235 1946-47). (REACTIVITY, 1999) First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992) Freedom of Information Act | Privacy & Security Statement | Disclaimers | Customer Survey | Important Web Site Notices | International | Contact l Is U.S. Department of Labor | Occupational Safety & Health Administration | 200 Constitution Ave., NW, Washington, DC 20210 Telephone: 800-321-OSHA (6742) | TTY: 877-889-5627 www.OSHA.gov



Symptoms
NA (See abbreviations)
(See abbreviations)
NA
(See abbreviations)
DOT Emergency Response Guidebook (ERG 2004)
Guide Number: 138
129 Substances Water Deactive (Emitting Flammable Cases)
POTENTIAL HAZARDS
FIRE OR EXPLOSION * Produce flammable cases on contact with water
* May ignite on contact with water or moist air.
 Some react vigorously or explosively on contact with water. May be ignited by heat, sparks or flames.
* May re-ignite after fire is extinguished.
 Some are transported in highly flammable liquids. Runoff may create fire or explosion hazard.
HEALTH
 Inhalation or contact with vapors, substance, or decomposition products may cause severe injury or death.
* May produce corrosive solutions on contact with water.
 rire will produce irritating, corrosive and/or toxic gases. Runoff from fire control may cause pollution.
PUBLIC SAFETY
Shipping Paper not available or no answer, refer to appropriate
telephone number listed on the inside back cover.
(160 to 330 feet) in all directions.
* Keep unauthorized personnel away.
* Keep out of low areas.
* Ventilate the area before entry.
* Wear positive pressure self-contained breathing apparatus (SCBA).
* Structural firefighters' protective clothing will only provide limited
EVACUATION
Large Spill
(800 feet).
Fire * If tank, rail car or tank truck is involved in a fire, ISOLATE for
800 meters (1/2 mile) in all directions; also, consider initial
evacuation for 800 meters (1/2 mile) in all directions.
FIRE
* DO NOT USE WATER OR FOAM. Small Fires
* Dry chemical, soda ash, lime or sand.
Large Fires * DRY sand, dry chemical, soda ash or lime or withdraw from area and let
fire burn.
 Move containers from fire area if you can do it without risk. Magnesium Fires
* DRY sand, sodium chloride powder, graphite powder or Met-L-X powder.
DRY sand, sodium chloride powder, graphite powder, copper powder or
Lith-X powder.
Fight fire from maximum distance or use unmanned hose holders or
monitor nozzles.
* Cool containers with flooding quantities of water until well after
fire is out. * Withdraw immediately in case of rising sound from venting cafety
devices or discoloration of tank.
* ALWAYS stay away from tanks engulfed in fire.
* ELIMINATE all ignition sources (no smoking, flares, sparks or flames
in immediate area). * Do not touch or walk through spilled material
* Stop leak if you can do it without risk.
* Use water spray to reduce vapors or divert vapor cloud drift. Avoid allowing water runoff to contact spilled material
* DO NOT GET WATER on spilled substance or inside containers.
Small Spills *Cover with DRY earth_DRY sand_or other non-combustible material

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=427

4/26/2010

 skin or eyes with running water for at least 20 minutes. Keep victim warm and quiet. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and severs. Do not use water. Cover all suspected material with dry sand or earth to prevent ignition until material can be permanently disposed of. (AR, 1999) Firefighting: Do not use water. Use graphite, soda ash, powdered sodium chloride, or suitable dry powder. If fire is massive, back off, protect surroundings, and let burn. Keep run-off water out of severs and water sources. (ARR, 1999) Reactivity: AIR AND WATER REACTIONS: Rapidly decomposes with water. The heat of reaction is sufficient that the evolved hydrogen may lignit (LaG. Govt. Chemist 1965). Barim reacts with water forming H2 gas and caustic solution; finely divided metal powder is prophoric (Bretherick, 1979 p. 170-171).CHEMICAL PROFILE: Boron trifluoride reacts with incandescnee when heated with alkali metals or alkaline earth metals except magnesium (Merck 11th ed. 1989). It has been determined experimentally that mixtures of finely divided barium metal and a number of halogenated hydrocarbons possess an explosive capability. Specifically, impact-sensitivity tests have shown that granular barium in contact with monofluorotrichloromethane, ritchlorotrifluoroethane, carion tetrachloride, trichlorotrifluore show that granular barium in contact with monofluorotrichlorone lenter. Do not put any ointmensk, oils, or medication in the victir's eyes without specific instructions from a physician. IMMEDIATELY fload affected skin with water while removing and isolating all contaminated dothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation) develop, IMMEDI	h plastic sheet to minimize spreading or contact with rain. er disposal; do not apply water unless directed to do so. ler spill with plastic sheet or tarp to minimize spreading wder dry. EAN-UP OR DISPOSE OF, EXCEPT UNDER SUPERVISION OF A to to fresh air. emergency medical service. .:al respiration if victim is not breathing. oxygen if breathing is difficult. d isolate contaminated clothing and shoes. contact with substance, wipe from skin immediately; flush
Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Do not use water. Cover all suspected material with dry sand or earth to prevent ignition until material can be permanently disposed of. (AAR, 1999) Firefighting: Do not use water. Use graphite, soda ash, powdered sodium chloride, or suitable dry powder. If fire is massive, back off, protect surroundings, and let burn. Keep run-off water out of sewers and water sources. (AAR, 1999) Reactivity: AIR AND WATER REACTIONS: Rapidly decomposes with water forming H2 gas and caustic solution; finely divided metal powder is pyrophoric (Bretherick, 1979 p. 170-171).CHEMICAL PROFILE: Boron trifluoride reacts with incadescence when heated with alkali metals or alkaline earth metals except magnesium (Merck 11H ed. 1989). It has been determined experimentally that mixtures of finely divided barium metal and a number of halogenated hydrocarbons possess an explosive capability. Specifically, impact-sensitivity tests have shown that granular barium in contact with monofluorotichloromethane, trichlorottane, carbon tetrachloride, trichloroethylene, or tetrachloroethylene can detonate (ASESB Pot. Incid. 39 1968; Chem. Eng. News 46(9):38 1968). (REACTIVITY, 1999) First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointemets, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop, SKIN: IMMEDIATELY transport the victim to a hospital Provide proper respiratory protection to maxin east take deep breaths of fresh air. If symptoms (such as wheezing, coupding, shortness of breadty, or burning in the mouth, throat,	warm and quiet. medical personnel are aware of the material(s) involved, ecautions to protect themselves.
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Freedom of Information Act Privacy & Security Statement Disclaimers Customer Survey Important Web Site Notices International Contact	ation Act Privacy & Security Statement Disclaimers Customer Survey Important Web Site Notices International Contact
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All DOL OSHA

Page 1 of 3

Advanced Search

🔊 RSS Feeds 🛛 🖨 Print This Page 🗧 🛨 Text Size 🛛 🔤 E-Mail This Page

OSHA/EPA Occupational Chemical Database

Chemical Identification

 Chemical Name: ARSENIC METAL AND INORGANIC COMPOUNDS, as As

 CAS #: 7440-38-2
 UN No: 1558
 Formula: As

 Synonyms: Arsenic metal: Arsenia Other synonyms vary depending upon the specific As compound.
 Formula: As

Physical Properties					
Physical Description: Me	etal: Silver-gray or tin-white,	brittle, odorle	ess solid.		
BP: Sublimes	MW : 74.9	LEL: NA	NFPA Fire Rating: 2		
FRZ/MLT: FRZ: NA	VP: NA	UEL: 1135ºF (Sublimes)	NFPA Health Rating: 3		
FP: NA	VD: NA		NFPA Reactivity Rating: 0		
Sp. GR: 5.73 (metal)	IP: NA		NFPA Sp. Inst.: NA		

Exposure Limits				
OSHA	NIOSH	Related Information		
PEL-TWA ppm: NA	REL-TWA ppm: NA	AIHA Emergency Response Planning Guidelines		
PEL-TWA mg/m3: 0.01	REL-TWA mg/m3: NA	- ERPG-1/ERPG-2/ERPG-3:		
PEL-STEL ppm: NA	REL-STEL ppm: NA			
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA			
PEL-C ppm: NA	REL-C ppm: NA			
PEL-C mg/m3: NA	REL-C mg/m3: 0.002	Carcinogen Classifications: IARC-1, NIOSH-Ca,		
Skin Notation: No	Skin Notation: No	NTP-K, OSHA-Ca, TLV-A1		
Notes: as As; SEE 29 CFR 1910.1018	Notes: CARCINOGEN (Ca); as As;15 MINUTE CEILING			
	IDLH ppm: NA			
	IDLH mg/m3: 5			
	IDLH Notes: Ca			

NIOSH Pocket Guide	e to Chemical Hazards (Cu	rrent through June 2006)			
Arsenic (inorganic	compounds, as As)		CAS: 7440-38-2			
Formula: As (metal)			RTECS: CG0525000 (metal)			
Synonyms & Trade Names: As compound.	Arsenic metal: Arsenia Other synony	yms vary depending upon the spe	cific DOT ID & Guide: 1558 152 (metal) 1562 152 (dust)			
Exposure Limits						
NIOSH REL: Ca C 0.002 mg	/m3 [15-minute] See Appendix A	OSHA PEL: [1910.1018] TWA	0.010 mg/m3			
IDLH: Ca [5 mg/m3 (as As)]	Conversion: NA				
Physical Description						
Metal: Silver-gray or tin-white, brittle, odorless solid.						
MW: 74.9	BP: Sublimes	MLT: 1135F (Sublimes)	Sol: Insoluble			
VP: 0 mmHg (approx)	IP: NA	RGasD: NA	Sp.Gr: 5.73 (metal)			
FI.P: NA	UEL: NA	LEL: NA	MEC: NA			
Metal: Noncombustible Solid in bulk form, but a slight explosion hazard in the form of dust when exposed to flame. (See flammable combustible liquid classes)						
Incompatibilities & Reactivities						
Strong oxidizers, bromine a	zide [Note: Hydrogen gas can react	with inorganic arsenic to form the	highly toxic gas arsine.]			
Measurement Methods						
NIOSH 7300, 7301, 7303, 7900, 9102; OSHA ID105						
Personal Protection & Sa	anitation	First Aid	First Aid			
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam/E	Daily	Eye: Irr immed Skin: Soap wash immed Breath: Resp support	Eye: Irr immed Skin: Soap wash immed Breath: Resp support			

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=426
5511	The IT Occupational Chemical Database	i un Report
Remo	ove: When wet or contam	Swallow: Medical attention immed
Chan	ige: Daily	(See procedures)
Provi	de: Eyewash, Quick drench	
NIOS	SH Respirator Recommendations	
NIOS	6H : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFAGHiE/SCBA	λE
(<u>See</u>	symbols and codes)	
Expo	osure Routes	
Inh A	Abs Con Ing	
Sym	ptoms	
Ulcer	ation of nasal septum, derm, GI disturbances, peri neur, resp	irrit, hyperpig of skin, [carc]
(<u>See</u>	abbreviations)	
Targ	et Organs	
Liver,	, kidneys, skin, lungs, lymphatic sys	
(<u>see</u>	abbreviations)	
DO	T Emergency Response Guidebook (ERG 200	4)
Guid	le Number: 152	
152	Substances - Toxic (Combustible)	
HFAI	ENTTAL HAZARDS	
*	Highly toxic, may be fatal if inhaled, swallowed or absorbed	through
skin.		No. and succ
*	Contact with molten substance may cause severe burns to si Avoid any skin contact.	kin and eyes.
*	Effects of contact or inhalation may be delayed.	
*	Fire may produce irritating, corrosive and/or toxic gases.	nd/or
1	toxic and cause pollution.	nu/or
FIRE	OR EXPLOSION	
*	Combustible material: may burn but does not ignite readily.	
*	Runoff may pollute waterways.	
*	Substance may be transported in a molten form.	
PUBI	LIC SAFETY	Danar first If
*	Shipping Paper not available or no answer, refer to appropria	aper first. If
	telephone number listed on the inside back cover.	
*	Isolate spill or leak area immediately for at least 25 to 50 me	eters
*	(80 to 160 feet) in all directions.	
*	Stay upwind.	
*	Keep out of low areas.	
*	Wear positive pressure self-contained breathing apparatus (SCBA)
*	Wear chemical protective clothing which is specifically recom	mended by
	the manufacturer. It may provide little or no thermal protecti	on.
Î^ _	structural firefighters' protective clothing provides limited	
	situations.	
EVAC	CUATION	
Spill *	See the Table of Initial Isolation and Protective Action Distar	nces for
	highlighted substances. For non-highlighted substances, incre	ease, in
	the downwind direction, as necessary, the isolation distance	shown
Fire	under PUBLIC SAFETY.	
*	If tank, rail car or tank truck is involved in a fire, ISOLATE for	r
	800 meters (1/2 mile) in all directions; also, consider initial	
EME	RGENCY RESPONSE	
FIRE		
Small	I Fires	
Large	e Fires	
*	Water spray, fog or regular foam.	
*	Move containers from fire area if you can do it without risk.	
ſ	material.	
*	Use water spray or fog; do not use straight streams.	
Fire i	nvolving Tanks or Car/Trailer Loads	ldors or
ſ	monitor nozzles.	
*	Do not get water inside containers.	
*	Cool containers with flooding quantities of water until well at	ter
*	Withdraw immediately in case of rising sound from venting s	afety
1	devices or discoloration of tank.	,
*	ALWAYS stay away from tanks engulfed in fire.	

http://www.osha.gov/web/dep/chemicaldata/ChemicalResult.asp?RecNo=426

For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn. SPILL OR LEAK Do not touch damaged containers or spilled material unless wearing appropriate protective clothing. Stop leak if you can do it without risk. Prevent entry into waterways, sewers, basements or confined areas. Cover with plastic sheet to prevent spreading. Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. DO NOT GET WATER INSIDE CONTAINERS. FIRST AID Move victim to fresh air. Call 911 or emergency medical service. Apply artificial respiration if victim is not breathing. Do not use mouth-to-mouth method if victim ingested or inhaled the substance; induce artificial respiration with the aid of a pocket mask equipped with a one-way valve or other proper respiratory medical device. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. For minor skin contact, avoid spreading material on unaffected skin. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep material out of water sources and sewers. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Cover solids with a plastic sheet to prevent dissolving in rain or fire fighting water. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Water spill: Use natural barriers or oil spill control booms to limit spill travel. Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. Remove trapped material with suction hoses. (AAR, 1999)

Firefighting: Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Use water in flooding quantities as fog. Use foam, dry chemical, or carbon dioxide. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Even at 10C, bromine trifluoride reacts with antimony incandescently. Bromine trifluoride reacts similarly with arsenic, boron, bromine, iodine, phosphorus, and sulfur (Mellor 2:113 1946-47). Bromoazide explodes on contact with antimony, arsenic, phosphorus, silver foil or sodium. When antimony or arsenic and solid potassium permanganate are ground together, the metals ignite (Mellor 12:322 1946-47). Sodium peroxide oxidizes antimony, arsenic, copper, potassium, tin, and zinc with incandescence (Mellor 2:490-93 1946-47). A combination of finely divided arsenic with finely divided bromates (also chlorates and iodates) of barium, calcium, magnesium, potassium, sodium, or zinc can explode by heat, percussion, and friction (Mellor 2:310 1946-47). Bromine pentafluoride reacts readily in the cold with arsenic ignition usually occurs. A few drops of the liquid falling in water produces an explosion. Fluorine vigorously reacts with arsenic and arsenic trioxide at ordinary temperatures (Mellor 9:34 1946-47). (REACTIVITY, 1999)

First Aid: Eye: If this chemical contacts the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids. Get medical attention immediately. Contact lenses should not be worn when working with this chemical. Skin: If this chemical contacts the skin, immediately wash the contaminated skin with soap and water. If this chemical penetrates the clothing immediately remove the clothing and wash the skin with soap and water. Get medical attention promptly. Breathing: If a person breathes large amounts of this chemical, move the exposed person to fresh air at once. If breathing has stopped, perform mouth-to-mouth resuscitation. Keep the affected person warm and at rest. Get medical attention as soon as possible. Swallow: If this chemical has been swallowed, get medical attention immediately. (NIOSH, 1997)

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Page 1 of 3

	STATES	2					O All D	OL 💿 OSHA	Advanced Search
L (() DEDART	MENTO	, Ic laraq	0						SEARCH
Occupation	al Safety & I	Health Admi	». nistration			A to Z Index	En Español Cor	ntact Us What's	New About OSHA
USHA HUMe						KSS Feeds	Print This Page	E F Text Size	E-Mail This Page
OSHA/EPA Occup	ational C	hemical D	atabase	•					
Chemical Identificat	tion								
Chemical Name: ACETON	NE								
CAS #: 67-64-1		UN No: 1	1090		Formula	: C3H6O			
Synonyms: Dimethyl keto	ne; Ketone pro	opane; 2-Propa	none						
Physical Properties								1	
Physical Properties								-	
Physical Description: Co		with a fragrant,	mint-like od	lor.				-	
BP: 133°F	VD: 180 mm		LEL: 2.5%		ating: 3			-	
FRZ/MLT: FKZ: -140°F	VP: 180 mm	нg	UEL: 12.8%					4	
FP: 0°F				NFPA React				4	
Sp. GR : 0.79	IP: 9.69 ev			NFPA Sp. II	nst.: NA			J	
								1	
Exposure Limits		. <u> </u>			r			_	
OSHA		NIOSH			Related Informa	ition		4	
PEL-TWA ppm: 1000		REL-TWA pp	om: 250		AIHA Emergency	y Response Pla	nning Guidelines		
PEL-TWA mg/m3: 2400		REL-TWA mo	g/m3 : 590		NA	-27 EIG 0-3.			
PEL-STEL ppm: NA		REL-STEL pp	om: NA		4				
PEL-STEL mg/m3: NA		REL-STEL m	g/m3: NA		4				
PEL-C ppm: NA		REL-C ppm:	NA					4	
PEL-C mg/m3: NA		REL-C mg/m	13: NA		Carcinogen Clas	sifications: TLV	'-A4		
Skin Notation: No		Skin Notation: No			4				
Notes: NA		Notes: NA	NA		4				
		IDLH ppm: 2	2500						
		IDLH mg/m	3: NA						
		IDLH Notes:	10% of LEL					J	
								1	
NIOSH Pocket Guid	le to Chem	ical Hazard	ls (Currer	nt through	June 2006)				
Acetone					CAS: 67-64-1				
Formula: (CH3)2CO				RTECS: AL3150000					
Synonyms & Trade Names	: Dimethyl ket	one, Ketone pro	opane, 2-Pro	panone		DOT ID & Guide	e: 1090 127		
Exposure Limits									
NIOSH REL: TWA 250 ppn	n (590 mg/m3))		OSHA PEL : T\	OSHA PEL : TWA 1000 ppm (2400 mg/m3)			1	
IDLH: 2500 ppm [10%LEL	.]			Conversion: 1	ppm = 2.38 mg/m3	4			
Physical Description									
Colorless liquid with a frag	rant, mint-like	odor.				r			
MW: 58.1	BP: 13	3F		FRZ: -140F		Sol: Miscible			
VP: 180 mmHg	IP: 9.6	9 eV		RGasD: NA		Sp.Gr: 0.79			
FI.P: OF	UEL: 1	2.8%		LEL: 2.5% MEC:					
Class IB Flammable Liquid	(See flammab	le and combust	tible liquid cl	<u>asses</u>)				4	
Incompatibilities & Rea	octivities							4	
Oxidizers, acids								4	
Measurement Methods								-	
NIOSH 1300, 2555, 3800;	OSHA 69		r					4	
Personal Protection & S	Sanitation			First Aid				4	
SKIN: Prevent skin contact Eves: Prevent eve contact				Eye: Irr immed Skin: Soan wa	a sh immed				
Wash skin: When contam				Breath: Resp s	support				
Remove: When wet (flammed the second	n)			Swallow: Medi	cal attention immed	1			
					<u></u>				

NIOSH Respirator Recommendations NIOSH 2500 ppm: CCROV*/PAPROV*/GMFOV/SA*/SCBAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE

e symbols and code	<u>s</u>)
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Exposure Routes

Inh Ing Con

Symptoms

Irrit eyes, nose, throat; head, dizz, CNS depres; derm (<u>See abbreviations</u>)

Target Organs

Eyes, skin, resp sys, CNS (<u>See abbreviations</u>)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 127

127	Flammable Liquids (Polar/Water-Miscible)
POTE	ENTIAL HAZARDS
FIRE	OR EXPLOSION
*	HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.
*	Vapors may form explosive mixtures with air.
*	Vapors may travel to source of ignition and flash back.
	collect in low or confined areas (sewers, basements, tanks)
*	Vanor explosion bazard indoors outdoors or in sewers
*	Those substances designated with a P may polymerize explosively when
	heated or involved in a fire.
*	Runoff to sewer may create fire or explosion hazard.
*	Containers may explode when heated.
*	Many liquids are lighter than water.
HEAL	LTH
*	Inhalation or contact with material may irritate or burn skin and eyes.
*	Fire may produce irritating, corrosive and/or toxic gases.
*	Punoff from fire control may cause pollution
PUB	IC SAFETY
*	CALL Emergency Response Telephone Number on Shipping Paper first. If
	Shipping Paper not available or no answer, refer to appropriate
	telephone number listed on the inside back cover.
*	Isolate spill or leak area immediately for at least 25 to 50 meters
	(80 to 160 feet) in all directions.
*	Keep unauthorized personnel away.
*	Stay upwillu.
*	Ventilate closed spaces before entering
PRO	TECTIVE CLOTHING
*	Wear positive pressure self-contained breathing apparatus (SCBA).
*	Structural firefighters' protective clothing will only provide limited
	protection.
EVAC	CUATION
Large	e Spill
Ŷ	Consider Initial downwind evacuation for at least 300 meters
Fire	(1000 leet).
*	If tank, rail car or tank truck is involved in a fire. ISOI ATE for
	800 meters (1/2 mile) in all directions: also, consider initial
	evacuation for 800 meters (1/2 mile) in all directions.
EME	RGENCY RESPONSE
FIRE	
CAUT	TON: All these products have a very low flash point: Use of water spray
Cmal	when fighting fire may be inefficient.
5maii *	I FIFES Dry chemical CO2 water spray or alcohol-resistant foam
l arge	Pries
*	Water sprav, fog or alcohol-resistant foam.
*	Use water spray or fog; do not use straight streams.
*	Move containers from fire area if you can do it without risk.
Fire i	nvolving Tanks or Car/Trailer Loads
*	Fight fire from maximum distance or use unmanned hose holders or
¥	monitor nozzles.
Ť	fire is out
*	Withdraw immediately in case of rising sound from venting safety
	devices or discoloration of tank.
*	ALWAYS stay away from tanks engulfed in fire.
*	For massive fire, use unmanned hose holders or monitor nozzles; if this
	is impossible, withdraw from area and let fire burn.
SPIL	L OR LEAK
*	ELIMINATE all ignition sources (no smoking, flares, sparks or flames

in immediate area). All equipment used when handling the product must be grounded. Do not touch or walk through spilled material.

*

- * Stop leak if you can do it without risk.
- * Prevent entry into waterways, sewers, basements or confined areas.
- * A vapor suppressing foam may be used to reduce vapors.
- * Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.
- Large Spills
- * Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- * Move victim to fresh air.
- * Call 911 or emergency medical service.
- * Apply artificial respiration if victim is not breathing.
- * Administer oxygen if breathing is difficult.
- * Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- * Wash skin with soap and water.
- * Keep victim warm and quiet.
- * Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to disperse vapors and dilute standing pools of liquid. Apply water spray or mist to knock down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Water spill: Use natural barriers or oil spill control booms to limit spill travel. Remove trapped material with suction hoses. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use "alcohol" foam, dry chemical or carbon dioxide. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: A mixture of acetone and chloroform in a residue bottle exploded. Since addition of acetone to chloroform in the presence of base will result in a highly exothermic reaction, it is thought that a base was in the bottle (MCA Case History 1661. 1970). Nitrosyl chloride sealed in a tube with a residue of acetone in the presence of platinum catayst gave an explosive reaction (Chem. Eng. News 35(43):60. 1967). The reaction of nitrsyl perchlorate and acetone ignites and explodes. Explosions occur with mixtures of nitrosyl perchlorate and primary amine (Ann. Chem. 42:2031. 1909). (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY call a not poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's is open and lay the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's open and lay the victim on his/her side with the head

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	STATES MENT 0) Elado:	0						SE	ARCH
		PLABU	in interation							
Occupationa	II Safety & I	Health Adm	Inistration			A to Z Index	En Espanol C	ontact Us 1	What's New About	OSHA
OSHA Home						RSS Feeds	🖶 Print This Pag	e 🗖 🖶 Te	xt Size 🛛 🖂 E-Mail Th	nis Page
OSHA/EPA Occup	ational C	hemical I	Database	•						
Chemical Identificat	ion									
Chemical Name: ISOPRO	PANOL									
CAS #: 67-63-0	I ANOL	UN No:	1219		Formul	a: C3H8O				
Synonyms: Dimethyl carbi	inol; IPA; Isop	ropanol; 2-Pro	panol; sec-Pr	ropyl alcohol; F	Rubbing alcohol; is	opropyl alcohol				
Physical Properties								٦		
Physical Description: Co	lorless liquid v	with the odor (of rubbing alc	ohol				-1		
BP: 181°F	MW: 60.1		LEL: 2.0%	NFPA Fire F	Rating: 3			-		
			UEL:		5			-		
FRZ/MLT: FRZ: -127ºF	VP: 33 mmH	g	(200ºF): 12.7%	NFPA Healt	th Rating: 1					
FP : 53ºF	VD: NA			NFPA React	tivity Rating: 0					
Sp. GR : 0.79	IP: 10.10 eV			NFPA Sp. II	nst.: NA					
								-		
Exposure Limits										
OSHA		NIOSH			Related Inform	ation		_		
PEL-TWA ppm: 400		REL-TWA p	pm: 400		AIHA Emergeno	y Response Pla	nning Guideline	s		
PEL-TWA mg/m3: 980		REL-TWA m	n g/m3 : 980		NA	-2/ERFG-3.				
PEL-STEL ppm: NA		REL-STEL p	pm: 500		-					
PEL-STEL mg/m3: NA		REL-STEL n	ng/m3: 1225	1	4					
PEL-C ppm: NA		REL-C ppm	NA					-		
PEL-C mg/m3: NA		REL-C mg/i	m3: NA			ssifications: IARC-3, TLV-A4				
		Skin Notati	on: NO		-					
Notes. NA			2000		-					
		IDI H ma/n	2000 13: NA							
		IDLH Notes	: 10% of LEL	EL						
					1					
NIOSH Pocket Guid	e to Chem	ical Hazar	ds (Currei	nt through	June 2006)					
Isopropyl alcohol					,	CAS: 67-63-0				
Formula: (CH3)2CHOH						RTECS: NT8050	0000	-		
Synonyms & Trade Names	: Dimethyl car	binol, IPA, Iso	propanol, 2-P	ropanol, sec-P	ropyl alcohol,	DOT ID & Guide	e: 1219 129	1		
Rubbing alcohol Exposure Limits								-		
NIOSH REL: TWA 400 ppm	n (980 mg/m3)	ST 500 ppm	(1225	OSHA PEL : T	WA 400 ppm (980	mg/m3)		-		
mg/m3)	1			Conversion: 1	nnm = 2.46 mc/m	3				
Physical Description]			COnversion. 1	ppm – 2.40 mg/m	5		-		
Colorless liquid with the od	lor of rubbina	alcohol.						-		
MW: 60.1	BP: 18	1F		FRZ: -127F		Sol: Miscible		-		
VP: 33 mmHg	IP: 10.	10 eV		RGasD: NA		Sp.Gr: 0.79		-		
FI.P: 53F	UEL(20	0F): 12.7%		LEL: 2.0%		MEC: NA				
Class IB Flammable Liquid	(See flammab	le and combu	stible liquid cl	<u>asses</u>)						
Incompatibilities & Rea	ctivities									
Strong oxidizers, acetaldeh	yde, chlorine,	ethylene oxid	e, acids, isocy	/anates						
Measurement Methods										
NIOSH 1400; OSHA 109										
Personal Protection & S	anitation			First Aid				_		
Skin: Prevent skin contact				Eye: Irr imme	d					
Wash skin: When contact Skin: Water f				Breath: Resp s	support					
Remove: When wet (flamm	n)			Swallow: Med	ical attention imme	d				
change: N.R.				(<u>See procedur</u>	<u>es</u>)					
NIOSH Respirator Reco	mmendation	s								
NIOSH/OSHA 2000 ppm: S	A:CF/CCRFOV	/GMFOV/PAPF	ROV/SCBAF/S	AF : SCBAF:PD	,PP/SAF:PD,PP:AS	CBA Escape: GMF	OV/SCBAE			
ļ								1		

(See symbols and codes)				
Exposure Routes				
Inh Ing Con				
Symptoms				
Irrit eyes, nose, throat; drow, dizz, head; dry cracking skin; in animals: narco (See abbreviations)				
Target Organs				
Eyes, skin, resp sys (See abbreviations)				
DOT Emergency Decrements (FDC 2004)				
DOT Emergency Response Guidebook (ERG 2004)				
Guide Number: 129				
129 Flammable Liquids (Polar/Water-Miscible/Noxious) POTENTIAL HAZARDS				
FIRE OR EXPLOSION				
 HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames. Vapore may form explosive mixtures with air 				
Vapors may form explosive mixtures with all: Vapors may travel to source of ignition and flash back.				
* Most vapors are heavier than air. They will spread along ground and				
collect in low or confined areas (sewers, basements, tanks).				
* Vapor explosion hazard indoors, outdoors or in sewers.				
I hose substances designated with a P may polymerize explosively when beated or involved in a fire.				
* Runoff to sever may create fire or explosion bazard				
* Containers may explode when heated.				
* Many liquids are lighter than water.				
HEALTH				
 May cause toxic effects if inhaled or absorbed through skin. Inhalation or contact with material may irritate or hum skin and evec 				
* Fire will produce irritating, corrosive and/or toxic cases.				
* Vapors may cause dizziness or suffocation.				
 Runoff from fire control or dilution water may cause pollution. 				
PUBLIC SAFETY				
* CALL Emergency Response Telephone Number on Shipping Paper first. If				
telenhone number listed on the inside have cover				
* Isolate spill or leak area immediately for at least 50 to 100 meters				
(160 to 330 feet) in all directions.				
* Keep unauthorized personnel away.				
* Stay upwind.				
 Neep out of low areas Ventiate closed spaces before entering 				
PROTECTIVE CLOTHING				
* Wear positive pressure self-contained breathing apparatus (SCBA).				
 Structural firefighters' protective clothing will only provide limited 				
protection.				
EVACUATION Large Spill				
Consider initial downwind evacuation for at least 300 meters				
(1000 feet).				
Fire				
If tank, rail car or tank truck is involved in a fire, ISOLATE for				
ouu meters (1/2 mile) in all directions; also, consider initial				
EVACUATION FOR OUT MELETS (1/2 TIME) IT All UNECTIONS.				
FIRE				
CAUTION: All these products have a very low flash point: Use of water spray				
when fighting fire may be inefficient.				
ISTIAIL FIRES				
To not use dry chemical extinguishers to control fires involving				
nitromethane or nitroethane.				
Large Fires				
Water spray, fog or alcohol-resistant foam.				
 Do not use straight streams. Move containers from fire area if you can do it without risk 				
Fire involving Tanks or Car/Trailer Loads				
 Fight fire from maximum distance or use unmanned hose holders or 				
monitor nozzles.				
* Cool containers with flooding quantities of water until well after				
IIIE IS UUE. * Withdraw immediately in case of rising sound from venting safety				
devices or discoloration of tank.				
* ALWAYS stay away from tanks engulfed in fire.				
 For massive fire, use unmanned hose holders or monitor nozzles; if this 				
is impossible, withdraw from area and let fire burn.				
SPILL OR LEAK				
ELIMITINALE all Ignition sources (no smoking, flares, sparks or flames in immediate area)				
 All equipment used when handling the product must be grounded. 				
* Do not touch or walk through spilled material.				
* Stop leak if you can do it without risk.				
 Prevent entry into waterways, sewers, basements or confined areas. 				
	•			

A vapor suppressing foam may be used to reduce vapors.
Absorb or cover with dry earth, sand or other non-combustible material
Use clean non-sparking tools to collect absorbed material.
arge Spills
Dike far ahead of liquid spill for later disposal.
Water spray may reduce vapor; but may not prevent ignition in closed
spaces. IRST AID
Move victim to fresh air.
Call 911 or emergency medical service.
Apply artificial respiration if victim is not breathing.
Remove and isolate contaminated clothing and shoes.
In case of contact with substance, immediately flush skin or eyes with
running water for at least 20 minutes.
wash skin with soap and water.
Effects of exposure (inhalation, ingestion or skin contact) to
substance may be delayed.
Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves
מוזע נעול ארכטעעטטוס נט אוטרברר עובווזסבואבס.
Additional Emergency Response Information (CAMEO Data)
Ion-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers.
juild dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to disperse vapors and likets of the needed of the neede
nate stantang pools of regiat. (ANK, 1597) Institutional and a stantang pools of regiat. (ANK, 1597)
renginning, bot not examples inter unless now can be supped, use water in nooming quantized as log, soild sucenis of water supped use "anay be effective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use "alcohol"
oam, dry chemical or carbon dioxide. (AAR, 1999)
eroxides. Contact with 2-butanone increases the reaction rate for peroxide formation. A violent, explosive reaction occurs when it is eated with (aluminum isopropoxide + crotonaldehyde). It forms explosive mixtures with trinitromethane and hydrogen peroxide. This hemical reacts with barium perchlorate to form a highly explosive compound. It ignites on contact with dioxygenyl tetrafluoroborate, hromium trioxide and potassium-tert-butoxide. Vigorous reactions occur with (hydrogen + palladium), nitroform, oleum, COCI2, luminum triisopropoxide and oxidizers. It also reacts explosively with phosgene in the presence of iron salts. It is incompatible with icids, acid anhydrides, halogens and aluminum. (NTP, 1992)
irst Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution or 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the ictim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no ymptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all ontaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation levelop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY eave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of Breathing, or uurning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper espiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) hould be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO IOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases he medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY all a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is conscious, do not jive anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the wody. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)
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DEPART	MENTO	, F LABO	R						SEARCH		
Occupationa	al Safety & I	-lealth Adm	inistration			A to Z Index	En Español Coi	ntact Us What's	New About OSHA		
	,										
USHA Home						SS Feeds	Print This Page	- + Text Size	E-Mail This Page		
OSHA/EPA Occup	ational C	hemical I	Database								
Chemical Identificat	tion										
Chemical Name: 1,2-DIC	HLOROETHYLE	ENE, ALL ISON	1ERS			C2112C12					
Synonyms: Acetylene dich	nloride; cis-Ace	tylene dichlor	ide; trans-Ace	tylene dichlori	de; sym-Dichloroet	nylene					
		,	•		. ,			-			
Physical Properties											
Physical Description: Co	olorless liquid (usually a mixt	ure of the cis	& trans isome	rs) with a slightly a	crid, chloroform-	like odor.				
BP: 118-140°F	MW: 97.0		LEL: 5.6%	NFPA Fire R	Rating: 3						
FRZ/MLT: FRZ: -57 to - 115°F	VP : 180-265	mmHg	UEL: 12.8%	NFPA Healt	h Rating: 2						
FP: 36-39ºF	VD: NA			NFPA React	tivity Rating: 2						
Sp. GR : (77ºF): 1.27	IP: 9.65 eV]	NFPA Sp. Ir	nst.: NA]			
								-			
Exposure Limits											
OSHA		NIOSH			Related Informa	ation					
PEL-TWA ppm: 200		REL-TWA p	pm: 200		AIHA Emergency	y Response Pla	nning Guidelines				
PEL-TWA mg/m3: 790		REL-TWA m	ig/m3 : 790		I- ERPG-1/ERPG-	-2/ERPG-3:					
PEL-STEL ppm: NA		REL-STEL p	pm: NA								
PEL-STEL mg/m3: NA		REL-STEL n	ng/m3: NA		1						
PEL-C ppm: NA		REL-C ppm	: NA								
PEL-C mg/m3: NA		REL-C mg/i	n3: NA Ca		Carcinogen Classifications: NA						
Skin Notation: No		Skin Notati	on: No		-						
Notes: NA		Notes: NA	1000		-						
			2. NA		-						
		IDLH INg/II	: NA		1						
<u></u>		1.22.1.10100			1			1			
NIOSH Pocket Guid	le to Chem	ical Hazar	ds (Currer	nt through	June 2006)			1			
1.2-Dichloroethyle	ne				/	CAS: 540-59-0		-			
Formula: CICH=CHCI						RTECS: KV9360	0000	-			
Synonyms & Trade Names	: Acetylene dio	chloride, cis-Ad	cetylene dichlo	oride, trans-Ac	etylene dichloride,	DOT ID & Guide	e: 1150 130P				
Exposure Limits											
NIOSH REL: TWA 200 ppm	n (790 mg/m3))		OSHA PEL: TW	/A 200 ppm (790 m	ıg/m3)					
IDLH: 1000 ppm			1	Conversion: 1	ppm = 3.97 mg/m3	3					
Physical Description]			
Colorless liquid (usually a r	mixture of the	cis & trans isc	mers) with a	slightly acrid, o	chloroform-like odo	r.					
MW: 97.0	BP: 118-140F		: 97.0 BP: 11		FRZ: -57 to -		15F	Sol: 0.4%			
VP: 180-265 mmHg	IP: 9.6	5 eV		RGasD: NA		Sp.Gr(77F): 1.2	.7	_			
Fl.P: 36-39F	UEL: 1	2.8%		LEL: 5.6%		MEC: NA		_			
Class IB Flammable Liquid	(See flammab	le and combu	stible liquid cla	asses)				-			
Incompatibilities & Rea	ctivities	. In all a data	EN		and the last the second second		7	_			
Strong oxidizers, strong all	kalis, potassiur	n nyaroxiae, a	opper [note:	Usually contai	ns inhibitors to prev	ent polymerizati	on.j	-			
								-			
Personal Protection & S	anitation			First Aid				-			
Skin: Provent skin contact								-			
Eyes: Prevent eye contact Skin: Soa					sh prompt						
Wash skin: When contam Remove: When wet (flamm)				Breath: Resp s Swallow: Medi	support	4					
Change: N.R. (See				(See procedure	es)	-					
NIOSH Pospirator D	mmondation	ic.						-			
NIOSH/OSHA 1000 ppm S	SA:CE/PAPROV	/CCRFOV/GMF	OV/SCBAF/S/	F : SCBAF.PD	.PP/SAF:PD PP.ASC	BA Escane: GMF	OV/SCBAF	1			
(See symbols and codes)]			
Exposure Routes]			
1								1			

Inh Ing Con						
Symptoms						
rrit eyes, resp sys; CNS depres See abbreviations)						
Target Organs						
Eyes, resp sys, CNS						
(See abbreviations)						
DOT Emergency Response Guidebook (ERG 2004)						
Guide Number: 130P						
130 Flammable Liquids (Non-Polar/Water-Immiscible/Noxious)						
POTENTIAL HAZARDS						
FIRE OR EXPLOSION HIGHLY EI AMMARI E: Will be easily ignited by beat sparks or flames						
Vapors may form explosive mixtures with air.						
* Vapors may travel to source of ignition and flash back.						
* Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (cawars, bacements, tanks).						
Vapor explosion hazard indoors, outdoors or in severs.						
* Those substances designated with a P may polymerize explosively when						
heated or involved in a fire.						
* Containers may explode when heated.						
* Many liquids are lighter than water.						
HEALIN * May cause toxic effects if inhaled or absorbed through skin.						
* Inhalation or contact with material may irritate or burn skin and eyes.						
 Fire will produce irritating, corrosive and/or toxic gases. 						
 vapors may cause dizziness or sunocation. * Runoff from fire control or dilution water may cause pollution. 						
PUBLIC SAFETY						
* CALL Emergency Response Telephone Number on Shipping Paper first. If						
telephone number listed on the inside back cover.						
* Isolate spill or leak area immediately for at least 50 to 100 meters						
(160 to 330 feet) in all directions. * Keen unauthorized personnel away						
* Stay upwind.						
* Keep out of low areas.						
PROTECTIVE CLOTHING						
* Wear positive pressure self-contained breathing apparatus (SCBA).						
 Structural firefighters' protective clothing will only provide limited protection 						
EVACUATION						
Large Spill						
 Consider initial downwind evacuation for at least 300 meters (1000 feet). 						
Fire						
* If tank, rail car or tank truck is involved in a fire, ISOLATE for						
evacuation for 800 meters (1/2 mile) in all directions.						
EMERGENCY RESPONSE						
HIRE CAUTION: All these products have a very low flash point: Use of water spray						
when fighting fire may be inefficient.						
Small Fires						
r → Dry cnemical, CO2, water spray or regular foam. Large Fires						
* Water spray, fog or regular foam.						
 Do not use straight streams. Move containers from fire area if you can do it without rick 						
Fire involving Tanks or Car/Trailer Loads						
* Fight fire from maximum distance or use unmanned hose holders or						
monitor nozzles. * Cool containers with flooding quantities of water until well after						
fire is out.						
Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.						
* ALWAYS stay away from tanks engulfed in fire.						
* For massive fire, use unmanned hose holders or monitor nozzles; if this						
is impossible, withdraw from area and let fire burn. SPILL OR LEAK						
* ELIMINATE all ignition sources (no smoking, flares, sparks or flames						
in immediate area).						
 An equipment used when handling the product must be grounded. * Do not touch or walk through spilled material. 						
* Stop leak if you can do it without risk.						
 Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing form may be used to reduce vapore. 						
 * Absorb or cover with dry earth, sand or other non-combustible material 						
and transfer to containers.						
use clean non-sparking tools to collect absorbed material. Large Spills						
	I.					

* Dike far ahead of liquid spill for later disposal.
* Water spray may reduce vapor; but may not prevent ignition in closed
FIRST AID
* Over victim to fresh air.
Call 911 or emergency medical service. Anny artificial respiration if victim is not breathing.
* Administer oxygen if breathing is difficult.
 Remove and isolate contaminated clothing and shoes. Iso accords contact with substance, isomethicate, if they acting an units
In case or contact with substance, immediately hush skin or eyes with running water for at least 20 minutes.
* Wash skin with soap and water.
 Keep victim warm and quiet. Efforts of avecause (inheliation insection or skin contact) to
substance may be delayed.
 Ensure that medical personnel are aware of the material(s) involved,
and take precautions to protect themselves.
The letter P following the guide number identifies those materials which present a polymerization hazard under certain conditions. First responders at the scene of a dangerous goods incident should seek additional specific information about any material in question as soon as possible. The information received by contacting the appropriate emergency response agency, the emergency response number on the shipping document, or by consulting the information on or accompanying the shipping document, may be more specific and accurate than this guidebook in providing guidance for the materials involved.
Additional Emergency Response Information (CAMEO Data)
Non-fire Spill Response: SMALL SPILLS AND LEAKAGE: If you spill this chemical, FIRST REMOVE ALL SOURCES OF IGNITION. Then, use absorbent paper to pick up all liquid spill material. Your contaminated clothing and absorbent paper should be sealed in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with 60-70% ethanol followed by washing with a soap and
water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.STORAGE PRECAUTIONS: You should protect this chemical from exposure to light. Keep the container tightly closed under an inert atmosphere, and store it in an explosion-proof refrigerator. STORE AWAY FROM SOURCES OF IGNITION. (NTP, 1992)
Firefighting: Fires involving this material should be controlled using a dry chemical, carbon dioxide or Halon extinguisher. A water spray may also be used. (NTP, 1992)
Reactivity: STABILITY: Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions This compound will decompose on exposure to air, moisture and light.REACTIVITY: This compound will react with alkalies, difluoromethylene, dihypofluorite, and nitrogen tetraoxide. Contact with solid caustic alkalies or their concentrated solutions will form chloroacetylene which ignites in air. Avoid contact with copper and copper alloys. It is corrosive to metals unless an inhibitor has been added. Oxidation in the presence of concentrated sulfuric acid or a free radical initiator gives chloroacetyl chloride via epoxide intermediates. It is incompatible with organic peroxides. (NTP, 1992)
First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as redness or irritation or burst) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convisiong or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital
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NIOSH Pocket Guide to Chemical Hazards (Current through June 2006)								
Ethylene dichloride CAS: 107-06-2								
Formula: CICH2CH2CI	Formula: CICH2CH2CI RTECS: KI0525000							
Synonyms & Trade Names: 1,2-Di	chloroethane; Ethylene chloride;	Glycol dichloride	DOT ID & Guide: 1184 131					
Exposure Limits								
NIOSH REL: Ca TWA 1 ppm (4 mg Appendix A See Appendix C (Chlo	NIOSH REL: Ca TWA 1 ppm (4 mg/m3) ST 2 ppm (8 mg/m3) See Appendix A See Appendix C (Chloroethanes) OSHA PEL : TWA 50 ppm C 100 ppm 200 ppm [5-minute maximum peak in any 3 hours]							
IDLH: Ca [50 ppm]		Conversion: 1 ppm = 4.05 mg/m3	3					
Physical Description								
Colorless liquid with a pleasant, cl	nloroform-like odor. [Note: Decom	poses slowly, becomes acidic & da	rkens in color.]					
MW: 99.0	BP: 182F	FRZ: -32F	Sol: 0.9%					
VP: 64 mmHg	IP: 11.05 eV	RGasD: NA	Sp.Gr: 1.24					
Fl.P: 56F	UEL: 16%	LEL: 6.2%	MEC: NA					
Class IB Flammable Liquid (See fla	ammable and combustible liquid c	lasses)						
Incompatibilities & Reactivitie	es							
Strong oxidizers & caustics; chemically-active metals such as magnesium or aluminum powder, sodium & potassium; liquid ammonia [Note: Decomposes to vinyl chloride & HCl above 1112F.]								
Measurement Methods								
NIOSH 1003; OSHA 3								
Personal Protection & Sanitat	ion	First Aid						
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam		Eye: Irr immed Skin: Soap wash prompt Breath: Resp support						

Remove: When wet (flamm)	Swallow: Medical attention immed
Change: N.R.	(See procedures)
Provide: Eyewash, Quick drench	
NIOSH Respirator Recommendations	
NIOSH · SCRAF.PD PP/SAF.PD PP·ASCRA Escape: GMEOV/SCRAF	
(See symbols and codes)	
Exposure Boutes	
Inh Ing Abs Con	
Symptoms	
Irrit eyes, corn opac; CNS depres; nau, vomit; derm; liver, kidney,	CVS damage; [carc]
(See abbreviations)	
Target Organs	
Eves skin kidnevs liver CNS CVS	
(See abbreviations)	
DOT Emergency Response Guidebook (ERG 200-	4)
Guide Number: 129	
129 Flammable Liquids (Polar/Water-Miscible/Novious)	
POTENTIAL HAZARDS	
FIRE OR EXPLOSION	
* HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks o	r flames.
* Vapors may form explosive mixtures with air.	
 Vapors may travel to source of ignition and flash back. Most uppers are beguing them air. The world shared all 	und and
must vapors are neavier than air. They will spread along group collect in low or confined areas (sewers, basements, tanks)	
 * Vapor explosion bazard indoors outdoors or in sewers 	
* Those substances designated with a P may polymerize explo	sively when
heated or involved in a fire.	,
* Runoff to sewer may create fire or explosion hazard.	
* Containers may explode when heated.	
* Many liquids are lighter than water.	
HEALTH * May cause toxic effects if inhaled or absorbed through skin	
 Inhalation or contact with material may irritate or burn skin a 	and eves
* Fire will produce irritating, corrosive and/or toxic gases.	
* Vapors may cause dizziness or suffocation.	
* Runoff from fire control or dilution water may cause pollution	ι.
PUBLIC SAFETY	
* CALL Emergency Response Telephone Number on Shipping R	Paper first. If
Shipping Paper not available or no answer, refer to appropria	te
 Isolate spill or leak area immediately for at least 50 to 100 m 	neters
(160 to 330 feet) in all directions.	
* Keep unauthorized personnel away.	
* Stay upwind.	
* Keep out of low areas.	
* Ventilate closed spaces before entering.	
* Wear positive process colf contained breathing apparatus (
* Structural firefighters' protective clothing will only provide lin	nited
protection.	
EVACUATION	
Large Spill	
* Consider initial downwind evacuation for at least 300 meters	
(1000 feet).	
* If tank rail car or tank truck is involved in a fire ISOLATE for	r
800 meters (1/2 mile) in all directions: also, consider initial	•
evacuation for 800 meters (1/2 mile) in all directions.	
EMERGENCY RESPONSE	
FIRE	
CAUTION: All these products have a very low flash point: Use of w	ater spray
Small Eiroc	
* Dry chemical, CO2 water spray or alcohol-resistant foam	
* Do not use dry chemical extinguishers to control fires involvi	ng
nitromethane or nitroethane.	
Large Fires	
* Water spray, fog or alcohol-resistant foam.	
 Do not use straight streams. Move containers from fire area if you are do it without with 	
Fire involving Tanks or Car/Trailer Loads	
* Fight fire from maximum distance or use unmanned hose bo	lders or
monitor nozzles.	
* Cool containers with flooding quantities of water until well af	ter
fire is out.	
* Withdraw immediately in case of rising sound from venting s	afety
devices or discoloration of tank.	

- * ALWAYS stay away from tanks engulfed in fire.
- * For massive fire, use unmanned hose holders or monitor nozzles; if this
- is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- * ELIMINATE all ignition sources (no smoking, flares, sparks or flames
- in immediate area).* All equipment used when handling the product must be grounded.
- * Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- * Prevent entry into waterways, sewers, basements or confined areas.
- * A vapor suppressing foam may be used to reduce vapors.
- * Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spills

- * Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- * Move victim to fresh air.
- ^{*} Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with
- running water for at least 20 minutes.
- * Wash skin with soap and water.
 * Keep victim warm and quiet.
- * Effects of exposure (inhalation, ingestion or skin contact) to
- substance may be delayed.
- * Ensure that medical personnel are aware of the material(s) involved,
- and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. Combustion products include corrosive or toxic vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Apply "universal" gelling agent to immobilize spill. Apply approriate foam to diminish vapor and fire hazard. Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. If dissolved, in region of 10 ppm or greater concentration, apply activated carbon at ten times the spilled amount. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may spread fire. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Liquid ammonia and ethylene dichloride can cause an explosion when mixed, NFPA 491M, 1991. A tank of dimethyl amino propyl amine exploded violently when it reacted with wet ethylene dichloride which had been the tanks previous contents, Doyle(1973). (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

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Page 1 of 3

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OSHA/EPA Occupational Chemical Database

Chemical Identification

 Chemical Name: 1,2-DICHLOROETHYLENE, ALL ISOMERS

 CAS #: 540-59-0
 UN No: 1150
 Formula: C2H2Cl2

 Synonyms: Acetylene dichloride; cis-Acetylene dichloride; trans-Acetylene dichloride; sym-Dichloroethylene

Physical Properties							
Physical Description: Colorless liquid (usually a mixture of the cis & trans isomers) with a slightly acrid, chloroform-like odor.							
BP : 118-140°F	MW: 97.0	LEL: 5.6%	NFPA Fire Rating: 3				
FRZ/MLT: FRZ: -57 to - 115°F	VP : 180-265 mmHg	UEL: 12.8%	NFPA Health Rating: 2				
FP : 36-39ºF	VD: NA		NFPA Reactivity Rating: 2				
Sp. GR: (77ºF): 1.27	IP : 9.65 eV		NFPA Sp. Inst.: NA				

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: 200	REL-TWA ppm: 200	AIHA Emergency Response Planning Guidelines
PEL-TWA mg/m3: 790	REL-TWA mg/m3: 790	- ERPG-1/ERPG-2/ERPG-3:
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA REL-STEL mg/m3: NA		
PEL-C ppm: NA	REL-C ppm: NA	
PEL-C mg/m3: NA	REL-C mg/m3: NA	Carcinogen Classifications: NA
Skin Notation: No	Skin Notation: No	
Notes: NA	Notes: NA	
	IDLH ppm: 1000	
	IDLH mg/m3: NA	
	IDLH Notes: NA	

NIOSH Pocket Guide to Chemical Hazards (Current through June 2006)							
1,2-Dichloroethylene			CAS: 540-59-0				
Formula: CICH=CHCI	RTECS: KV9360000						
Synonyms & Trade Names: Acety sym-Dichloroethylene	lene dichloride, cis-Acetylene dich	loride, trans-Acetylene dichloride,	DOT ID & Guide: 1150 130P				
Exposure Limits							
NIOSH REL: TWA 200 ppm (790	mg/m3)	OSHA PEL: TWA 200 ppm (790 mg/m3)					
IDLH: 1000 ppm		Conversion: 1 ppm = 3.97 mg/m3					
Physical Description							
Colorless liquid (usually a mixture	r.						
MW: 97.0 BP: 118-140F		FRZ: -57 to -115F	Sol: 0.4%				
VP: 180-265 mmHg	IP: 9.65 eV	RGasD: NA	Sp.Gr(77F): 1.27				
FI.P: 36-39F	UEL: 12.8%	LEL: 5.6%	MEC: NA				
Class IB Flammable Liquid (See fl	ammable and combustible liquid c	lasses)					
Incompatibilities & Reactiviti	es						
Strong oxidizers, strong alkalis, p	otassium hydroxide, copper [Note:	Usually contains inhibitors to prev	ent polymerization.]				
Measurement Methods							
NIOSH 1003; OSHA 7							
Personal Protection & Sanitat	tion	First Aid					
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet (flamm) Change: N.R.		Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed (<u>See procedures</u>)					

NIOSH Respirator Recommendations

NIOSH/OSHA 1000 ppm: SA:CF/PAPROV/CCRFOV/GMFOV/SCBAF/SAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE (See symbols and codes)
Exposure Routes
Inh Ing Con
Symptoms
Irrit eyes, resp sys; CNS depres (See abbreviations)
Target Organs

Eyes, resp sys, CNS (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 130P

130 F	lammable	Liqui	ids (Non-P	Polar	/Water	-Im	misci	ble/Noxi	ious)
POTE	NTIAL HAZ	ARD	S						
FIRE	OR EXPLOS	SION	l						
*	HIGHLY FLA	MMA	BLE: Will be	e eas	ily ignite	ed by	heat,	sparks or	flames.
*	Vapors may	form	explosive r	nixtu	res with	air.			
				<i>c</i> ·		1.0			

- Vapors may travel to source of ignition and flash back.
- * Most vapors are heavier than air. They will spread along ground and
- collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- * Those substances designated with a P may polymerize explosively when heated or involved in a fire.
- * Runoff to sewer may create fire or explosion hazard.
- * Containers may explode when heated.
- * Many liquids are lighter than water.

HEALTH

- * May cause toxic effects if inhaled or absorbed through skin.
- * Inhalation or contact with material may irritate or burn skin and eyes.
- * Fire will produce irritating, corrosive and/or toxic gases.
- * Vapors may cause dizziness or suffocation.
- * Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- * CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate
- telephone number listed on the inside back cover. * Isolate spill or leak area immediately for at least 50 to 100 meters
- (160 to 330 feet) in all directions.
- Keep unauthorized personnel away.
 Stau unusuad
- * Stay upwind.* Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

Wear positive pressure self-contained breathing apparatus (SCBA).
 Structural firefighters' protective clothing will only provide limited

protection.

EVACUATION

Large Spill

* Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fires

* Dry chemical, CO2, water spray or regular foam.

Large Fires

- * Water spray, fog or regular foam.
- * Do not use straight streams.
- * Move containers from fire area if you can do it without risk.
- Fire involving Tanks or Car/Trailer Loads
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- * Cool containers with flooding quantities of water until well after fire is out.
- * Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- * ALWAYS stay away from tanks engulfed in fire.
- For massive fire, use unmanned hose holders or monitor nozzles; if this
- is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

* ELIMINATE all ignition sources (no smoking, flares, sparks or flames

in immediate area).

- * All equipment used when handling the product must be grounded.
- * Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- * A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- * Use clean non-sparking tools to collect absorbed material.

Large Spills

- * Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air.
- Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- * Administer oxygen if breathing is difficult.
- * Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with
- running water for at least 20 minutes.
- * Wash skin with soap and water.
- Keep victim warm and quiet.
- * Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

The letter **P** following the guide number identifies those materials which present a polymerization hazard under certain conditions. First responders at the scene of a dangerous goods incident should seek additional specific information about any material in question as soon as possible. The information received by contacting the appropriate emergency response agency, the emergency response number on the shipping document, or by consulting the information on or accompanying the shipping document, may be more specific and accurate than this guidebook in providing guidance for the materials involved.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: SMALL SPILLS AND LEAKAGE: If you spill this chemical, FIRST REMOVE ALL SOURCES OF IGNITION. Then, use absorbent paper to pick up all liquid spill material. Your contaminated clothing and absorbent paper should be sealed in a vapor-tight plastic bag for eventual disposal. Solvent wash all contaminated surfaces with 60-70% ethanol followed by washing with a soap and water solution. Do not reenter the contaminated area until the Safety Officer (or other responsible person) has verified that the area has been properly cleaned.STORAGE PRECAUTIONS: You should protect this chemical from exposure to light. Keep the container tightly closed under an inert atmosphere, and store it in an explosion-proof refrigerator. STORE AWAY FROM SOURCES OF IGNITION. (NTP, 1992)

Firefighting:	Fires involving this	material should	be controlled	l using a dry	chemical,	carbon d	lioxide or	Halon exti	nguisher. <i>i</i>	A water :	spray
may also be u	sed. (NTP, 1992)										

Reactivity: STABILITY: Solutions of this chemical in water, DMSO, 95% ethanol or acetone should be stable for 24 hours under normal lab conditions This compound will decompose on exposure to air, moisture and light.REACTIVITY: This compound will react with alkalies, difluoromethylene, dihypofluorite, and nitrogen tetraoxide. Contact with solid caustic alkalies or their concentrated solutions will form chloroacetylene which ignites in air. Avoid contact with copper and copper alloys. It is corrosive to metals unless an inhibitor has been added. Oxidation in the presence of concentrated sulfuric acid or a free radical initiator gives chloroacetyl chloride via epoxide intermediates. It is incompatible with organic peroxides. (NTP, 1992)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop, SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

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OSHA Home					RSS Feeds	🖨 Print This Page	🗖 🛨 Text Size	🖂 E-Mail This Pag	
OSHA/EPA Occ	upational C	hemical [Database	<u>,</u>					
Chemical Identifi	ication								
Chemical Name: VIN	YLIDENE CHLORI	DE							
Synonyms: 1,1-DCE; Vinylidene dichloride	1,1-Dichloroethen	e; 1,1-Dichloro	ethylene; VD	C; Vinylidene	chloride monomer;	a: C2H2CI2 Vinylidene chlorid	e, inhibited;		
Physical Properti	ies							1	
Physical Description	1: Colorless liquid	or gas (above	89ºF) with a	mild, sweet, c	hloroform-like odor			-	
BP : 89°F	MW: 96.9		LEL: 6.5%	NFPA Fire	Rating: 4			-	
FRZ/MLT: FRZ: -1890	PF VP : 500 mm	nHg	UEL: 15.5%	NFPA Heal	th Rating: 2			-	
FP: -2°F	VD: NA	-		NFPA Read	ctivity Rating: 2			-	
Sp. GR : 1.21	IP: 10.00 e	/		NFPA Sp. I	nst.: NA]	
								1	
Exposure Limits		· · · · · · · · · · · · · · · · · · ·			1			_	
OSHA		NIOSH			Related Inform	ation		-	
PEL-TWA ppm: NA		REL-TWA p	pm: NA		AIHA Emergeno	y Response Pla			
PEL-TWA mg/m3: N	IA	REL-TWA m	ng/m3: NA		- NA	-2/ LRF G-3.			
PEL-STEL ppm: NA		REL-STEL p	pm: NA		_				
PEL-STEL mg/m3: N	IA	REL-STEL m	ng/m3: NA		-				
PEL-C ppm: NA		REL-C ppm:						-	
PEL-C mg/m3: NA		REL-C mg/r	m3: NA		Carcinogen Clas	sifications: IAR	C-3, NIOSH-Ca,		
Skin Notation: No		Skin Notati	ON: NO		-				
Notes: NA		EXPOSURE T CONCENTRA	O LOWEST F	EASIBLE .4 ppm)					
		IDLH ppm:	NA						
		IDLH mg/m	n3: NA						
	IDLH Notes: Ca							J	
NIOSH Pocket G	uide to Chen	nical Hazar	de (Curre	nt through	1une 2006)			1	
Vipylidene eble	rido			ne unougi	1 June 2000)	CAS: 75-35-4		-	
	nue					DTECC 14/0275		-	
Formula: CH2=CCl2 Synonyms & Trade Na	mes: 1 1-DCF: 1	I-Dichloroether	ne: 1 1-Dichle	vroethvlene: V		DOT ID & Guide	000 • 1303 130P	-	
chloride monomer; Vin	nylidene dichloride	Demorocurer		Jocurylenc, v		(inhibited)	. 1505 1501		
Exposure Limits								_	
NIOSH REL: Ca See Ap	NIOSH REL: Ca See Appendix A OSHA PEL			OSHA PEL : n	ione			_	
IDLH: Ca [N.D.]	_			Conversion: N	NA			-	
Physical Description		a mild averat	able veferme li	ka adau				-	
						Salt 0.040/		-	
MW: 90.9	IDP: 05		RGasD: NA			Sol. 0.04%		-	
FL P· -2F	IF. 10	.00 ev	LEL: 6.5%		MFC: NA		-		
Class IA Flammable Lie	auid (See flammal	ble and combus	stible liquid o	asses)				1	
Incompatibilities &	Reactivities							1	
Aluminum, sunlight, ai	r, copper, heat [N	ote: Polymeriza	ation may oc	cur if exposed	to oxidizers, chloro	sulfonic acid, nitri	c acid, or oleum.	1	
Inhibitors such as the	monomethyl ethe	r of hydroquind	one are adde	d to prevent p	olymerization.]				
Measurement Metho	ods							1	
NIOSH 1015; OSHA 19)								
Personal Protection	& Sanitation			First Aid				4	
Skin: Prevent skin con Eyes: Prevent eye con Wash skin: When cont	tact tact am			Eye: Irr imme Skin: Soap flu Breath: Resp	ed ısh immed support				
ļ									

· · · · · · · · · · · · · · · · · · ·	
Remove: When wet (flamm)	Swallow: Medical attention immed
Change: N.R.	(See procedures)
Provide: Eyewash, Quick drench	
NIOSH Respirator Recommendations	
NIOSH : SCBAE:PD.PP/SAE:PD.PP:ASCBA Escape: GMEOV/SCBAE	
(See symbols and codes)	
Exposure Boutes	
Inn Abs Ing Con	
Symptoms	
Irrit eyes, skin, throat; dizz, head, nau, dysp; liver, kidney dysfunc	; pneuitis; [carc]
(<u>See abbreviations</u>)	
Target Organs	
Eves, skin, resp sys, CNS, liver, kidneys	
(See abbreviations)	
DOT Emergency Response Guidebook (ERG 200-	4)
Guide Number: 129P	
129 Flammable Liquids (Polar/Water-Miscible/Noxious)	
POTENTIAL HAZARDS	
FIRE OR EXPLOSION	
* HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks of	r flames.
 vapors may form explosive mixtures with air. Vapors may travel to source of ignitizer and flack here. 	
 Vapors filay travel to source of ignition and fiash back. Most vapors are beavier than air. They will spread along group 	und and
collect in low or confined areas (sewers, basements, tanks).	
* Vapor explosion hazard indoors, outdoors or in sewers.	
 * Those substances designated with a P may polymerize explo 	sively when
heated or involved in a fire.	
 Runoff to sewer may create fire or explosion hazard. Containers may evaluate when heated 	
Containers may explore when heated. Many liquids are lighter than water	
HEALTH	
* May cause toxic effects if inhaled or absorbed through skin.	
* Inhalation or contact with material may irritate or burn skin a	and eyes.
* Fire will produce irritating, corrosive and/or toxic gases.	
* Vapors may cause dizziness or suffocation.	
* Runoff from fire control or dilution water may cause pollution	۱.
YUBLIC SAFETY * CALL Emergency Recoonse Telephone Number on Shinning I	Paper first If
Shipping Paper not available or no answer, refer to appropria	ite
telephone number listed on the inside back cover.	
 Isolate spill or leak area immediately for at least 50 to 100 m 	neters
(160 to 330 feet) in all directions.	
 Keep unauthorized personnel away. Characterized descent and the second sec	
 Stay upwind. Keen out of low proof. 	
Ventilate closed spaces before entering.	
PROTECTIVE CLOTHING	
* Wear positive pressure self-contained breathing apparatus (S	SCBA).
 Structural firefighters' protective clothing will only provide lin 	nited
protection.	
EVACUATION	
* Consider initial downwind evacuation for at least 300 meters	
(1000 feet).	
Fire	
* If tank, rail car or tank truck is involved in a fire, ISOLATE for	ır
800 meters (1/2 mile) in all directions; also, consider initial	
evacuation for 800 meters (1/2 mile) in all directions.	
EIVIERGEINUT KEOPUINOE	
CAUTION: All these products have a very low flash point: Use of w	ater spray
when fighting fire may be inefficient.	
Small Fires	
 Dry chemical, CO2, water spray or alcohol-resistant foam. 	
Do not use any chemical extinguishers to control fires involvi nitromethane or nitroethane.	ng
Large Fires	
* Water spray, fog or alcohol-resistant foam.	
* Do not use straight streams.	
* Move containers from fire area if you can do it without risk.	
Fire involving Tanks or Car/Trailer Loads	ldene en
 Fight fire from maximum distance or use unmanned hose homosphere 	iders or
 MONILOF NOZZIES. Cool containers with flooding quantities of water until wall of 	ter
fire is out.	
* Withdraw immediately in case of rising sound from venting s	afety
devices or discoloration of tank.	
F	

- ALWAYS stay away from tanks engulfed in fire. For massive fire, use unmanned hose holders or monitor nozzles; if this
- is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- * ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- * All equipment used when handling the product must be grounded.
- * Do not touch or walk through spilled material.
- * Stop leak if you can do it without risk.
- * Prevent entry into waterways, sewers, basements or confined areas.
- * A vapor suppressing foam may be used to reduce vapors.
- * Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spills

- ^k Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- * Move victim to fresh air.
- ^{*} Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with
- running water for at least 20 minutes.
- * Wash skin with soap and water.
- * Keep victim warm and quiet.
- * Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

The letter **P** following the guide number identifies those materials which present a polymerization hazard under certain conditions. First responders at the scene of a dangerous goods incident should seek additional specific information about any material in question as soon as possible. The information received by contacting the appropriate emergency response agency, the emergency response number on the shipping document, or by consulting the information on or accompanying the shipping document, may be more specific and accurate than this guidebook in providing guidance for the materials involved.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers. Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. Combustion products include corrosive or toxic vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Apply approriate foam to diminish vapor and fire hazard. Water spill: Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. Inject "universal" gelling agent to solidify encircled spill and increase effectiveness of booms. Remove trapped material with suction hoses. Use mechanical dredges or lifts to remove immobilized masses of pollutants and precipitates. (AAR, 1999)

Firefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may be ineffective. Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Use foam, dry chemical, or carbon dioxide. (AAR, 1999)

Reactivity: CHEMICAL PROFILE: Peroxidizable monomer may initiate exothermic polymerization of the bulk material (Bretherick 1979. p. 160, 187). Mixing vinylidene chloride in equal molar portions in a closed container with any of the following substances caused the temperature and pressure to increase:chlorosulfonic acid, nitric acid, or oleum (NFPA 1991). (REACTIVITY, 1999)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. IMMEDIATELY call a hospital or poison control center even if no symptoms (such as redness or irritation) develop. IMMEDIATELY transport the victim to a hospital for treatment after washing the affected areas. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. IMMEDIATELY call a physician and be prepared to transport the victim to a hospital even if no symptoms (such as wheezing, coughing, shortness of Breathing, or burning in the mouth, throat, or chest) develop. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is convulsing or unconscious, do not give anything by mouth, ensure that the victim's airway is open and lay the victim on his/her side with the Headache lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. OTHER: Since this chemical is a known or suspected carcinogen you should contact a physician for advice regarding the possible long term health effects and potential recommendation for medical monitoring. Recommendations from the physician will depend upon the specific compound, its chemical, physical and toxicity properties, the exposure level, length of exposure, and the route of exposure. (NTP, 1992)

OSHA

dichloride **Exposure Limits**

MW: 99.0

FI.P: 2F

VP: 182 mmHg

(Chloroethanes) IDLH: 3000 ppm

Physical Description

NIOSH REL: TWA 100 ppm (400 mg/m3) See Appendix C

BP: 135F

IP: 11.06 eV

UEL: 11.4%

Class IB Flammable Liquid (See flammable and combustible liquid classes)

Colorless, oily liquid with a chloroform-like odor.

Incompatibilities & Reactivities Strong oxidizers, strong caustics Measurement Methods NIOSH 1003; OSHA 7

Personal Protection & Sanitation

Skin: Prevent skin contact

Eyes: Prevent eye contact

Wash skin: When contam

Change: N.R.

Remove: When wet (flamm)

OSHA/EPA Occupational Chemical Database - Full Report									Page 1 of 3
A UNITED	STATES							OL 💿 OSHA	Advanced Search
DEPARI	ENT OF	FLARO	R						SEARCH
Occupation	al Safety & H	inistration			A to Z Index En Espa	añol Con	tact Us What's	New About OSHA	
OSHA Home						💦 RSS Feeds 🛛 🖨 Print	This Page	- 🕂 Text Size	🛛 E-Mail This Page
OSHA/EPA Occuj	oational Ch	nemical [Database						
Chemical Identifica	ition								
Chemical Name: 1,1-DI	CHLOROETHANE								
CAS #: 75-34-3		UN No:	2362		Formula	: C2H4Cl2			
Synonyms: Asymmetrica	l dichloroethane;	; Ethylidene c	hloride; 1,1-E	thylidene dichloride					
Physical Properties	5								
Physical Description: (Colorless, oily liqu	uid with a chlo	oroform-like o	dor.					
BP: 135°F	MW: 99.0		LEL: 5.4%	NFPA Fire Rating	g: 3				
FRZ/MLT: FRZ: -143°F	VP: 182 mmH	lg	UEL: 11.4%	NFPA Health Rat	ting: 2				
FP: 2ºF	VD: NA	-		NFPA Reactivity	Rating: 0				
Sp. GR: 1.18	IP: 11.06 eV			NFPA Sp. Inst.:	NA				
Exposure Limits									
OSHA	1	NIOSH		Rela	ated Informa	tion			
PEL-TWA ppm: 100		REL-TWA p	om: 100	AIH	A Emergency	Response Planning Gu			
PEL-TWA mg/m3: 400	ĺ	REL-TWA m	g/m3 : 400	- ER	- ERPG-1/ERPG-2/ERPG-3:				
PEL-STEL ppm: NA	ĺ	REL-STEL p	pm: NA	NA					
PEL-STEL mg/m3: NA	1	REL-STEL m	ng/m3: NA						
PEL-C ppm: NA	Î	REL-C ppm:	NA						
PEL-C mg/m3: NA	Î	REL-C mg/r	n3 : NA	Card	Carcinogen Classifications: TLV-A4				
Skin Notation: No	Î	Skin Notatio	on: No						
Notes: NA Notes: NA									
IDLH ppm: 3000									
IDLH mg/m3: NA									
	ĺ	IDLH Notes	: NA						
NIOSH Pocket Gui	de to Chemi	cal Hazar	ds (Curren	t through Jun	e 2006)				
1,1-Dichloroethar	ne					CAS: 75-34-3			
Formula: CHCl2CH3						RTECS: KI0175000			
Synonyms & Trade Name	s: Asymmetrical	dichloroethar	ne; Ethylidene	chloride; 1,1-Ethyli	dene	DOT ID & Guide: 2362 13	30		

OSHA PEL: TWA 100 ppm (400 mg/m3)

Sol: 0.6%

MEC: NA

Sp.Gr: 1.18

Conversion: 1 ppm = 4.05 mg/m3

FRZ: -143F

RGasD: NA

LEL: 5.4%

First Aid

Eye: Irr immed

Skin: Soap flush prompt

Swallow: Medical attention immed

Breath: Resp support

(See procedures)

NIOSH Respirator Recommendations

NIOSH/OSHA 1000 ppm: SA 2500 ppm: SA:CF 3000 ppm: SCBAF/SAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE (See symbols and codes) Exposure Routes Inh Ing Con Symptoms Irrit skin; CNS depres; liver, kidney, lung damage (See abbreviations) Target Organs Skin, liver, kidneys, lungs, CNS (See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 130

130 Flammable Liquids (Non-Polar/Water-Immiscible/Noxious) POTENTIAL HAZARDS FIRE OR EXPLOSION * HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames. * Vapors may form explosive mixtures with air.

- * Vapors may travel to source of ignition and flash back.
- * Most vapors are heavier than air. They will spread along ground and
- collect in low or confined areas (sewers, basements, tanks).
- * Vapor explosion hazard indoors, outdoors or in sewers.
- * Those substances designated with a P may polymerize explosively when heated or involved in a fire.
- * Runoff to sewer may create fire or explosion hazard.
- * Containers may explode when heated.
- * Many liquids are lighter than water.

HEALTH

- * May cause toxic effects if inhaled or absorbed through skin.
- * Inhalation or contact with material may irritate or burn skin and eyes.
- * Fire will produce irritating, corrosive and/or toxic gases.
- * Vapors may cause dizziness or suffocation.
- * Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

* CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate

- telephone number listed on the inside back cover.
 * Isolate spill or leak area immediately for at least 50 to 100 meters (160 to 330 feet) in all directions.
- Keep unauthorized personnel away.
- * Stay upwind.
- Keep out of low areas.
- * Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

Wear positive pressure self-contained breathing apparatus (SCBA).
 Structural firefighters' protective clothing will only provide limited

protection.

EVACUATION

Large Spill

* Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

* If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fires

* Dry chemical, CO2, water spray or regular foam.

Large Fires

- * Water spray, fog or regular foam.
- * Do not use straight streams.
- * Move containers from fire area if you can do it without risk.
- Fire involving Tanks or Car/Trailer Loads
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- * Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- * ALWAYS stay away from tanks engulfed in fire.
- * For massive fire, use unmanned hose holders or monitor nozzles; if this
- is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

* ELIMINATE all ignition sources (no smoking, flares, sparks or flames

in immediate area).

 All equipment used when handling the product must be grounded. Do not tow do wilk through spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, severs, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. A basorb or cover with dry earth, sand or other non-combustible material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Large Spills Dike far ahead of liquid spill for later disposal. Water spray may reduce vapor; but may not prevent ignition in closed spaces. FIRST AID Move victim to fresh air. Call 911 or emergency medical service. Apply artificial respiration if victim is not breathing. Administer oxygen if breathing is difficult. Remove and isolate contaminated clothing and shoes. In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with soap and water. Keep victim warm and quiet. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sweers Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down va (AAR, 1999) Reactivity: STABILITY: This compound is heat sensitive. Solutions of this chemical in water, DMSO, 95% ethanol or acetone should stable for 24 hours under normal lab conditions.REACTIVITY: This chemical can react vigorously with water or normal sali	hen handling the product must be grounded. through spilled material. be it without risk. Som may be used to reduce vapors. Som may be used to reduce vapors. Som may be used to reduce vapors. I develop a start of the star	 All equipment used when handling the product must be grounded. Do not touch or walk trough spilled material. Stop leak if you can do it without risk. Prevent entry into waterways, severs, basements or confined areas. Absorb or cover with dry earth, sand or other non-combustile material and transfer to containers. Use clean non-sparking tools to collect absorbed material. Marge prevent thy and or other non-combustile material. Wate signs may reduce vapor; but may not prevent lightion in closed spaces. Wate signs may reduce vapor; but may not prevent lightion in closed spaces. Wate signs may reduce vapor; but may not prevent lightion in closed spaces. Marge prevent thy the same model as wrice. Administer constant, this tobatence, immediately flush skin or eyes with running water for at least 20 minutes. Wate signs contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wate signs contact with substance, immediately flush skin or eyes with running water for at least 20 minutes. Marge prevent this soap and valuer. Effects of exposure (Inhiation, ingestion or skin contact) to Effects of exposure (Inhiation, ingestion or skin contact) to and ake precautions to protect themselves. Mardificial Response: Keep sparks, filmes, and other sources of lightion away. Keep material dut of water sources and severs. XAR, 1999) Trief Juli Contact with subscand. A stamp to topic leak if without undue precommel hazard. Use water spray to knock-down vapors. XAR, 1999) Trief Juli Contact with subscand. A stamp to topic leak if without undue precommel and avater may be inference. Cool at laffected containers with floading quantities of water. Use "lacohol" foam, dry chemical or careton do nokade. Keep run-off atter out of severs and water sources. (AA	İ	n immediate area).
 * Do not touch or walk through spilled material. * Stop leak if you can do it without risk. * Prevent entry into waterways, sewers, basements or confined areas. * A vapor suppressing foam may be used to reduce vapors. * Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers. * Use clean non-sparking tools to collect absorbed material. Large Spills * Dike far ahead of liquid spill for later disposal. * Water spray may reduce vapor; but may not prevent ignition in closed spaces. FIRST AID * Call 911 or emergency medical service. * Apply artificial respiration if victim is not breathing. * Administer oxygen if breathing is difficult. * Remove and isolate contaminated clothing and shoes. * Keep victim warm and quiet. * Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. * Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. * Additional Emergency Response Information (CAMEO Data) Non-fire Spill Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and sewers Build dikes to contain flow as necessary. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vaj (ARR, 199) * Frefighting: Do not extinguish fire unless flow can be stopped. Use water in flooding quantities as fog. Solid streams of water may ineffective. Cool all affected containers with flooding quantities of water. Use "alcohol" foam, dry chemical or carbon dioxide. Keep ro water out of severs and water sources. (ARR, 1999) * Reactivity: STABILIT	through spilled material. of without risk. terways, sewers, basements or confined areas. to an may be used to reduce vapors. dry earth, sand or other non-combustible material res. ig tools to collect absorbed material. id spill for later disposal. 	 Do not touch or walk through spilled material. Stop leak if you can do it without rak. Prevent entry into waterways, sewers, basements or confined areas. A vapor suppressing foam may be used to reduce vapors. Busch or cover with dry earth, sand or other non-combustible material and transfer to containes. Use clean non-sparking tools to collect absorbed material. Bage Spills Die for ahead of liquid spill for later disposal. Wates graym may reduce vapor, but may not prevent lightion in closed waters. Apply artificial respiration if victims in the treating. Wash skin with soap and water. Keep victim warm and quict. Effects of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Therea that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Additional Emergency Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and severs. Sulid dikes to contain flow as necessary. Attempt to stop basels. Contain diven divet may be applyce. Therefore, Coo	*	All equipment used when handling the product must be grounded.
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To race of contract with substance, immediately flush skin or eyes with running water for at least 20 minutes. Wash skin with scopa and variets. Fiftest of exposure (inhalation, ingestion or skin contact) to substance may be delayed. Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves. Vaditional Emergency Response Information (CAMEO Data) Van-fire Splil Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources and severs. Vadiditional Emergency Material Store and the sources of ignition away. Keep material out of water sources and severs. Vadid severa and water sources. (AAR, 1999) Varier Splil Response: Keep sparks, flames, and other sources of ignition away. Keep material out of water sources should be table for 24 hours under normal kab contitions. REACTIVITY: This chemical in water, DMSO, 95% ethanol or acetone should be table for 24 hours under normal kab contitions. 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OSHA/EPA Occupat	ional Chemical Database - Full R	Report	Page 1 of 3
UNITED S DEPARTM Occupational S	TATES ENT OF LABOR Gafety & Health Administration	All DOL OSHA	Advanced Search SEARCH 's New About OSHA
OSHA Home		💦 RSS Feeds 🛛 🖨 Print This Page 📄 🕂 Text Size	e 🛛 E-Mail This Page
OSHA/EPA Occupat	ional Chemical Database		
Chemical Identification	n		
Chemical Name: 1,1,1-TRIC	HLOROETHANE		
CAS #: 71-55-6	UN No: 2831	Formula: C2H3Cl3	
Synonyms: Chlorothene; 1,1,	1-Trichloroethane; 1,1,1-Trichloroethane (stabili	ized)	

Physical Properties							
Physical Description: Colorless liquid with a mild, chloroform-like odor.							
BP : 165ºF	MW: 133.4	LEL: 7.5%	NFPA Fire Rating: 1				
FRZ/MLT: FRZ: -23ºF	VP : 100 mmHg	UEL: 12.5%	NFPA Health Rating: 2				
FP: NA	VD: NA		NFPA Reactivity Rating: 0				
Sp. GR : 1.34	IP: 11.00 eV		NFPA Sp. Inst.: NA				

Exposure Limits		
OSHA	NIOSH	Related Information
PEL-TWA ppm: 350	REL-TWA ppm: NA	AIHA Emergency Response Planning Guidelines
PEL-TWA mg/m3: 1900	REL-TWA mg/m3: NA	- ERPG-1/ERPG-2/ERPG-3: 350 ppm / 700 ppm / 3500 ppm
PEL-STEL ppm: NA	REL-STEL ppm: NA	
PEL-STEL mg/m3: NA	REL-STEL mg/m3: NA	
PEL-C ppm: NA	REL-C ppm : 350	
PEL-C mg/m3: NA	REL-C mg/m3 : 1900	Carcinogen Classifications: IARC-3, TLV-A4
Skin Notation: No	Skin Notation: No	
Notes: NA	Notes: 15 MINUTE CEILING	
	IDLH ppm: 700	
	IDLH mg/m3: NA	
	IDLH Notes: NA	

NIOSH Pocket Guide to (Chemical Hazards (Curre	nt through June 2006)	
Methyl chloroform		CAS: 71-55-6	
Formula: CH3CCl3		RTECS: KJ2975000	
Synonyms & Trade Names: Chloro	othene; 1,1,1-Trichloroethane; 1,1	1,1-Trichloroethane (stabilized)	DOT ID & Guide: 2831 160
Exposure Limits			
NIOSH REL: C 350 ppm (1900 mg/m3) [15-minute] See Appendix C (Chloroethanes)		OSHA PEL : TWA 350 ppm (1900 mg/m3)	
IDLH: 700 ppm		Conversion: 1 ppm = 5.46 mg/m3	
Physical Description			
Colorless liquid with a mild, chloro	form-like odor.		
MW: 133.4	BP: 165F	FRZ: -23F	Sol: 0.4%
VP: 100 mmHg	IP: 11.00 eV	RGasD: NA	Sp.Gr: 1.34
Fl.P: ?	UEL: 12.5%	LEL: 7.5%	MEC: NA
Combustible Liquid, but burns with	h difficulty. (<u>See flammable and c</u>	ombustible liquid classes)	
Incompatibilities & Reactivitie	es		
Strong caustics; strong oxidizers; [Note: Reacts slowly with water to	chemically-active metals such as a o form hydrochloric acid.]	zinc, aluminum, magnesium powo	ders, sodium & potassium; water
Measurement Methods			
NIOSH 1003			
Personal Protection & Sanitation		First Aid	
Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contam Remove: When wet or contam Change: N.R.		Eye: Irr immed Skin: Soap wash prompt Breath: Resp support Swallow: Medical attention immed (See procedures)	

NIOSH Respirator Recommendations

NIOSH/OSHA 700 ppm: SA*/SCBAF : SCBAF:PD,PP/SAF:PD,PP:ASCBA Escape: GMFOV/SCBAE (See symbols and codes)

Exposure Routes

Inh Ing Con

Symptoms

Irrit eyes, skin; head, lass, CNS depres, poor equi; derm; card arrhy; liver damage See abbreviations)

Target Organs

Eyes, skin, CNS, CVS, liver

See abbreviations)

DOT Emergency Response Guidebook (ERG 2004)

Guide Number: 160

160 Halogenated Solvents POTENTIAL HAZARDS HEALTH Vapors may cause dizziness or suffocation.

- Exposure in an enclosed area may be very harmful.
- Contact may irritate or burn skin and eyes.
- Fire may produce irritating and/or toxic gases.
- Runoff from fire control or dilution water may cause pollution.
- FIRE OR EXPLOSION
- Some of these materials may burn, but none ignite readily.
- Most vapors are heavier than air.
- Air/vapor mixtures may explode when ignited. Container may explode in heat of fire.
- PUBLIC SAFETY
- CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate
- telephone number listed on the inside back cover.
- Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Many gases are heavier than air and will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Keep out of low areas.
- Ventilate closed spaces before entering.
- PROTECTIVE CLOTHING
- Wear positive pressure self-contained breathing apparatus (SCBA). Structural firefighters' protective clothing will only provide limited protection.
- EVACUATION

Large Spill

Consider initial downwind evacuation for at least 100 meters (330 feet).

Fire

If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

EMERGENCY RESPONSE

FIRE

Small Fires Dry chemical, CO2 or water spray.

- Large Fires
- Dry chemical, CO2, alcohol-resistant foam or water spray.
- Move containers from fire area if you can do it without risk.
- Dike fire control water for later disposal; do not scatter the material.
- Fire involving Tanks or Car/Trailer Loads
- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from tanks engulfed in fire.
- SPILL OR LEAK
- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- Stop leak if you can do it without risk.
- Small Liquid Spills
- Take up with sand, earth or other noncombustible absorbent material. Large Spills
- Dike far ahead of liquid spill for later disposal.
- Prevent entry into waterways, sewers, basements or confined areas.

FIRST AID

- * Move victim to fresh air.
- * Call 911 or emergency medical service.
- Apply artificial respiration if victim is not breathing.
- * Administer oxygen if breathing is difficult.
- * Remove and isolate contaminated clothing and shoes.
- * In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- running water for at least 20 minutes.
- For minor skin contact, avoid spreading material on unaffected skin.
 Wash skin with soap and water.
- wash skin with soap and wate
 Keep victim warm and quiet.
- * Ensure that modeal percented are aware
- Ensure that medical personnel are aware of the material(s) involved, and take processitions to protect themselves
- and take precautions to protect themselves.

Additional Emergency Response Information (CAMEO Data)

Non-fire Spill Response: Keep material out of water sources and sewers. Attempt to stop leak if without undue personnel hazard. Use water spray to knock-down vapors. Land spill: Dig a pit, pond, lagoon, holding area to contain liquid or solid material. Dike surface flow using soil, sand bags, foamed polyurethane, or foamed concrete. Absorb bulk liquid with fly ash, cement powder, or commercial sorbents. Water spill: Use natural barriers or oil spill control booms to limit spill travel. Use natural deep water pockets, excavated lagoons, or sand bag barriers to trap material at bottom. Remove trapped material with suction hoses. (AAR, 1999)

Firefighting: Cool all affected containers with flooding quantities of water. Apply water from as far a distance as possible. Extinguish fire using agent suitable for type of surrounding fire. (Material itself does not burn or burns with difficulty.) Keep run-off water out of sewers and water sources. (AAR, 1999)

Reactivity: STABILITY: This chemical is hygroscopic. It is oxidized by atmospheric oxygen at high temperatures. It is reactive to sunlight at high altitudes. Solutions of this chemical in anhydrous DMSO or ethanol should be stable for 24 hours under normal lab conditions.REACTIVITY: This chemical decomposes in the presence of chemically active metals. This includes aluminum, magnesium and their alloys. It will react violently with dinitrogen tetraoxide, oxygen, liquid oxygen, sodium and sodium-potassium alloys. It will also react violently with acetone, zinc and nitrates. It can react with sodium hydroxide. It is incompatible with strong oxidizers and strong bases. Mixtures with potassium or its alloys are shock-sensitive and may explode on light impact. This chemical can react with an aqueous suspension of calcium hydroxide, and with chlorine in sunlight. It will attack some forms of plastics, rubber and coatings. Upon contact with hot metal or on exposure to ultraviolet radiation, it will decompose to form irritant gases. A cobalt/molybdenum-alumina catalyst will generate a substantial exotherm on contact with its vapor at ambient temperatures. Hazardous reactions also occur with (aluminum oxide + heavy metals). (NTP, 1992)

First Aid: EYES: First check the victim for contact lenses and remove if present. Flush victim's eyes with water or normal saline solution for 20 to 30 minutes while simultaneously calling a hospital or poison control center. Do not put any ointments, oils, or medication in the victim's eyes without specific instructions from a physician. IMMEDIATELY transport the victim after flushing eyes to a hospital even if no symptoms (such as redness or irritation) develop. SKIN: IMMEDIATELY flood affected skin with water while removing and isolating all contaminated clothing. Gently wash all affected skin areas thoroughly with soap and water. If symptoms such as redness or irritation develop, IMMEDIATELY call a physician and be prepared to transport the victim to a hospital for treatment. INHALATION: IMMEDIATELY leave the contaminated area; take deep breaths of fresh air. If symptoms (such as wheezing, coughing, shortness of breath, or burning in the mouth, throat, or chest) develop, call a physician and be prepared to transport the victim to a hospital. Provide proper respiratory protection to rescuers entering an unknown atmosphere. Whenever possible, Self-Contained Breathing Apparatus (SCBA) should be used; if not available, use a level of protection greater than or equal to that advised under Protective Clothing. INGESTION: DO NOT INDUCE VOMITING. Volatile chemicals have a high risk of being aspirated into the victim's lungs during vomiting which increases the medical problems. If the victim is conscious and not convulsing, give 1 or 2 glasses of water to dilute the chemical and IMMEDIATELY call a hospital or 2 glasses of water to idlute the chemical and IMMEDIATELY call a nospital or poison control center. IMMEDIATELY transport the victim to a hospital. If the victim is conscious, do not give anything by mouth, ensure that the victim's open and lay the victim on his/her side with the head lower than the body. DO NOT INDUCE VOMITING. IMMEDIATELY transport the victim to a hospital. (NTP, 1992)

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Attachment D

Air Monitoring Form



ISTR Program Solvents Recovery Service of New England

Air Monitoring Report Form

Date:

Activities:

Equipment:

Sample Location	Time	Background	Results

Conducted by: _	
-----------------	--



Attachment E

Health and Safety Plan Pre-Entry Briefing Attendance Form



Health and Safety Plan Pre-Entry Briefing Attendance Form

ISTR Program Solvents Recovery Service of New England

Briefing Conducted By: _____ Date Performed: _____

Printed Name	Signature	Representing



Attachment F

Incident Report Form

Incident Report # IR-_

TerraTherm Incident Repor	t Form			
Background				
Date of Incident: Time of Incid	lent: AM / PM			
Type of Incident (Check One): Near Miss	First Aid Medical Treatment			
If Hospitalized, Name of Institution:	iransported By:			
Name of Person Injured:	of Rody:			
	ы воду: 			
Type of Injury (Check One):				
Strain/Sprain Bruising Burn/Scald	Foreign Body			
Fracture Scratch/Abrasion Dislocation	Chemical Reaction			
Laceration/Cut Amputation Internal	Other (Specify):			
The Incident				
Describe the events leading up to the incident Identify any equipment/mat	erials involved			
become the evente leading up to the moldent. Identity any equipment mat				
ptic				
scri				
Des				
Identify any possible causes of the incident (e.g., malfunction of equipment	, misuse of materials).			
(A)				
Cal				
What action has as will be taken to provent a requirement?				
what action has of will be taken to prevent a recurrence?				
Investigation				
Report Completed By:	Date:			
Print Name Signature				
Witness(es) to Accident:				
	Date:			
Print Name Signature				
Drint Manag	Date:			
Print Name Signature				
ALL INCIDENTS MUST BE REPORTED IMMEDIATELY TO	COMPANY SAFETY MANAGER			

THIS FORM MUST BE FORWARDED TO FITCHBURG OFFICE NO LATER THAN 24 HOURS AFTER THE INCIDENT