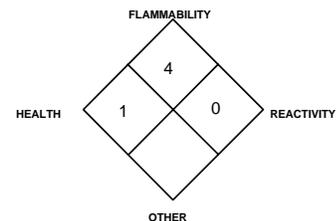


**NFPA RATING**

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

PART I *What is the material and what do I need to know in an emergency?*

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS:

METHYL CHLORIDE - CH₃Cl

Document Number: P-0036

PRODUCT USE:

For general analytic/synthetic chemical uses.

SUPPLIER/MANUFACTURER'S NAME:

MESA Specialty Gases & Equipment

ADDRESS:

3619 Pendleton Avenue, Suite C
Santa Ana, CA 92704

BUSINESS PHONE:

1-714-434-7102

EMERGENCY PHONE:

INFOTRAC: 1-800-535-5053

DATE OF PREPARATION:

May 20, 1996

SECOND REVISION:

January 23, 1998

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA		IDLH ppm	OTHER
			TLV ppm	STEL ppm	PEL ppm	STEL ppm		
Methyl Chloride	74-87-3	> 99.5%	50, Skin A4 (Not Classifiable as Human Carcinogen)	100	100 50 (Vacated 1989 PEL)	200 C; 300 (5 minute max peak in any 3 hours) 100 (Vacated 1989 PEL)	2000	NIOSH REL: Reduce to lowest feasible level. DFG MAK: 50 ppm Carcinogen: NIOSH-X MAK-B IARC-3
Maximum Impurities		< 0.5%	None of the trace impurities in this mixture contribute significantly to the hazards associated with the product. All hazard information pertinent to this product has been provided in this Material Safety Data Sheet, per the requirements of the OSHA Hazard Communication Standard (29 CFR 1910.1200) and State equivalent standards.					

NE = Not Established

C = Ceiling Limit

See Section 16 for Definitions of Terms Used

NOTE: All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: Methyl Chloride is a colorless, flammable liquid which rapidly turns into a gas at standard atmospheric temperatures and pressures. The gas has a faintly sweet, non-irritating odor. Methyl Chloride is toxic, and inhalation of high concentrations can lead to central nervous system depression which could be incapacitating. Overexposure to the gas could cause headache, nausea, dizziness, drowsiness, confusion, unconsciousness, and death. Both the liquid and gas pose a serious fire hazard when accidentally released. The gas is heavier than air, and may spread long distances. Distant ignition and flashback are possible. Rapid evaporation of liquid from cylinder may cause frostbite. Flame or high temperature impinging on a localized area of the cylinder of Methyl Chloride can cause the cylinder to rupture without activating the cylinder's relief devices. Provide adequate fire protection during emergency response situations.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of overexposure for Methyl Chloride are by inhalation or contact. The symptoms of overexposure to Methyl Chloride by route of exposure are as follows:

INHALATION: Exposure to levels as low as 1000 ppm have resulted in depression of the central nervous system. The effects may resemble drunkenness and include headache, nausea, vomiting, dizziness distorted vision, hand tremors, light-headedness, memory loss, muscular incoordination, weakness, slurred speech, and mental confusion.

Methyl Chloride can hydrolyze in the body's cells, producing hydrochloric acid and methyl alcohol. The alcohol-like odor to the breath may be due to the Methyl Alcohol. Hydrochloric acid and methyl alcohol can cause degenerative changes in the lungs, brain, kidney, and liver. Adverse effects on the blood have been reported (e.g., decreased percentage of hemoglobin, decreased red blood cells, increase in white blood cells).

Effects of slight exposure may be delayed. Severe effects from massive releases have caused immediate and fatal effects (unconsciousness, convulsions, respiratory collapse and death). Individuals with mild forms of poisoning usually recover. However, effects from severe exposure may persist for months and even years. Neurobehavioral changes including depression, changes in personality, irritability and insomnia can also develop following prolonged exposure. Other adverse effects include reduced tolerance to alcohol, decreased sexual drive, and mild but permanent neurological and/or psychiatric symptoms.

Fatal Methyl Chloride poisoning can have symptoms similar to those of severe non-fatal poisoning. Apparent recovery from what initially appears to be a mild exposure through inhalation may be followed by serious, and potentially fatal, health effects (i.e. pulmonary edema, cerebral edema, and circulatory failure).

SKIN CONTACT: The gas is not irritating to the skin. Accidental spraying of the liquid or gas may cause burns from freezing. Skin absorption may be significant and may produce effects similar to those seen following inhalation.

EYE CONTACT: Methyl Chloride gas is not irritating to the eyes, even at levels that produce toxicity. Accidental spraying of the liquid or gas into the eye(s) may cause burns from freezing.

OTHER POTENTIAL HEALTH EFFECTS: Contact with liquid or rapidly expanding gases (which are released under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain after such contact can quickly subside.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. Overexposure to Methyl Chloride may cause the following health effects:

ACUTE: The most significant hazard associated with Methyl Chloride is inhalation of vapors, which can be mildly toxic at low levels, and cause the appearance of drunkenness, staggering, dizziness, nausea, possible hiccups, and adverse effects on the blood. The breath may have an alcohol-like odor. Contact with liquid or rapidly expanding gases may cause frostbite. High level, acute exposure can cause mild to severe neurobehavioral changes and potentially fatal pulmonary edema, cerebral edema, and circulatory failure.

HAZARDOUS MATERIAL INFORMATION SYSTEM			
HEALTH		(BLUE)	2
FLAMMABILITY		(RED)	4
REACTIVITY		(YELLOW)	0
PROTECTIVE EQUIPMENT			C
EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8
For routine industrial applications			

See Section 16 for Definition of Ratings

3. HAZARD IDENTIFICATION (Continued)

CHRONIC: Exposures of at least two weeks to levels of 200-400 ppm have produced central nervous system effects (drowsiness, dizziness, misty vision, mental confusion, staggering, and slurred speech). Methyl Chloride is a possible carcinogen and may alter genetic material. Overexposure may cause reproductive disorders and mild but permanent neurological effects. Refer to Section 11 (Toxicological Information) of this MSDS for additional information.

TARGET ORGANS: Nervous system, liver, kidneys, respiratory system, blood system.

PART II *What should I do if a hazardous situation occurs?*

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO METHYL CHLORIDE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus and Fire-Retardant Personal Protective equipment should be worn. Adequate fire protection must be provided during rescue situations.

Remove victim(s) to fresh air, as quickly as possible. Trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary. Only trained personnel should administer supplemental oxygen.

In case of frostbite, place the frostbitten part in warm water. DO NOT USE HOT WATER. If warm water is not available, or is impractical to use, wrap the affected parts gently in blankets. Alternatively, if the fingers or hands are frostbitten, place the affected area in the armpit. Encourage victim to gently exercise the affected part while being warmed. Seek immediate medical attention.

Victim(s) must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to physician or other health professional with victim(s).

5. FIRE-FIGHTING MEASURES

FLASH POINT (Closed Cup): -45.6°C (-50°F)

AUTOIGNITION TEMPERATURE: 632.2°C (1170°F)

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): 8.1%

Upper (UEL): 17.2%

FIRE EXTINGUISHING MATERIALS: Extinguish Methyl Chloride fires by shutting-off the source of the gas. Use water spray to cool fire-exposed containers, structures, and equipment. Use water spray, carbon dioxide or dry chemicals as extinguishing media.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Flammable gas. Very dangerous fire hazard when exposed to heat, flame or powerful oxidizers.

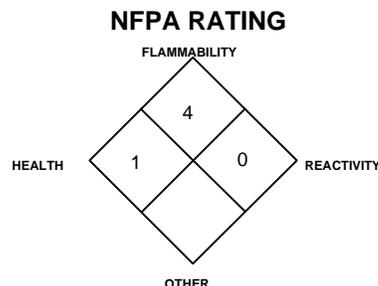
During a fire, toxic gases (i.e. hydrogen chloride, chlorine, and phosgene) may be produced. Methyl Chloride explodes on contact with interhalogens (e.g., bromine trifluoride; bromine pentafluoride); magnesium and alloys; potassium and alloys; zinc. Potentially explosive reaction with aluminum when heated to 152°C (306°F) in a sealed container. May ignite on contact with aluminum chloride or powdered aluminum. Gas is heavier than air and may hug the ground and travel a considerable distance to a source of ignition and flash back to a leak or open container. Methyl Chloride presents an explosion hazard in confined spaces. Water spray should be used with care. Methyl Chloride can be hydrolyzed, and will form hydrochloric acid.

DANGER! Fires impinging (direct flame) on the outside surface of unprotected pressure storage vessels of Methyl Chloride can be very dangerous. Direct flame exposure on the cylinder wall can cause an explosion either by BLEVE (Boiling Liquid Expanding Vapor Explosion), or by exothermic decomposition. This is a catastrophic failure of the vessel releasing the contents into a massive fireball and explosion. The resulting fire and explosion can result in severe equipment damage and personnel injury or death over a large area around the vessel. For massive fires in large areas, use unmanned hose holder or monitor nozzles; if this is not possible, withdraw from area and allow fire to burn.

Explosion Sensitivity to Mechanical Impact: Not sensitive.

Explosion Sensitivity to Static Discharge: Static discharge may cause Methyl Chloride to ignite explosively.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment. The best fire-fighting technique may be simply to let the burning gas escape from the pressurized cylinder, tank car, or pipeline. Stop the leak before extinguishing fire. If the fire is extinguished before the leak is sealed, the still-leaking gas could explosively re-ignite without warning and cause extensive damage, injury, or fatality.



See Section 16 for Definition of Ratings

5. FIRE-FIGHTING MEASURES (Continued)

SPECIAL FIRE-FIGHTING PROCEDURES (continued): In this case, increase ventilation (in enclosed areas) to prevent flammable or explosive mixture formation. Structural fire-fighters must wear Self-Contained Breathing Apparatus and full protective equipment. Because of the potential for a BLEVE, evacuation of non-emergency personnel is essential. If water is not available for cooling or protection of vessel exposures, evacuate the area.

6. ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a release, clear the affected area, protect people, and respond with trained personnel. Adequate fire protection must be provided.

Minimum Personal Protective Equipment should be **Level B: fire-retardant protective clothing, mechanically-resistant gloves and Self-Contained Breathing Apparatus**. Use only non-sparking tools and equipment. Locate and seal the source of the leaking gas. Protect personnel attempting the shut-off with water-spray. Allow the gas to dissipate. Monitor the surrounding area for combustible gas levels and oxygen. Combustible gas concentration must be below 10% of the LEL (LEL = 8.1%) prior to entry. A colorimetric tube is also available for Methyl Chloride. If a colorimetric tube is used to indicate the concentration of Methyl Chloride, the reading obtained should be lower than the limits indicated in Section 2 (Composition and Information on Ingredients). The atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus.

Attempt to close the main source valve prior to entering the area. If this does not stop the release (or if it is not possible to reach the valve), allow the gas to release in-place or remove it to a safe area and allow the gas to be released there.

THIS IS AN EXTREMELY FLAMMABLE GAS WHICH IS ALSO TOXIC. Protection of all personnel and the area must be maintained.

PART III *How can I prevent hazardous situations from occurring?*

7. HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting Methyl Chloride IN YOU. Do not eat or drink while handling chemicals. Be aware of any signs of effects of Methyl Chloride exposure indicated in Section 3 (Hazard Identification); exposures to fatal concentrations of Methyl Chloride could occur rapidly.

STORAGE AND HANDLING PRACTICES: Cylinders should be stored in dry, well-ventilated areas away from sources of heat. Compressed gases can present significant safety hazards. Store containers away from heavily trafficked areas and emergency exits. Store away from oxidizers, corrosives and other incompatibles such as aluminum chloride, alkali metals, such as sodium, magnesium and sodium potassium alloy. Post "No Smoking or Open Flames" signs in storage or use areas.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: Protect cylinders against physical damage. Store in cool, dry, well-ventilated area, away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52°C (125°F). Use a check valve or trap in the discharge line to prevent hazardous backflow. Cylinders should be stored upright and be firmly secured to prevent falling or being knocked over. Cylinders can be stored in the open, but in such cases, should be protected against extremes of weather and from the dampness of the ground to prevent rusting. Never tamper with pressure relief devices in valves and cylinders. Electrical equipment should be non-sparking or explosion proof. The following rules are applicable to work situations in which cylinders are being used:

Before Use: Move cylinders with a suitable hand-truck. Do not drag, slide or roll cylinders. Do not drop cylinders or permit them to strike each other. Secure cylinders firmly. Leave the valve protection cap, if provided, in-place until cylinder is ready for use.

During Use: Use designated CGA fittings and other support equipment. Do not use adapters. Do not heat cylinder by any means to increase the discharge rate of the product from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment.

After Use: Close main cylinder valve. Replace valve protection cap, if provided. Mark empty cylinders "EMPTY".

NOTE: Use only DOT or ASME code containers. Earth-ground and bond all lines and equipment associated with Methyl Chloride. Close valve after each use and when empty. Cylinders must not be recharged except by or with the consent of owner. For additional information refer to the Compressed Gas Association Pamphlet P-1, *Safe Handling of Compressed Gases in Containers*. Additionally, refer to CGA Bulletin SB-2 "Oxygen Deficient Atmospheres".

7. HANDLING and STORAGE (Continued)

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain application equipment is locked and tagged-out safely. Purge gas handling equipment with inert gas (i.e. nitrogen) before attempting repairs. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Local exhaust ventilation is preferred, because it prevents Methyl Chloride dispersion into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the presence of potentially explosive air-gas mixtures and the level of oxygen.

RESPIRATORY PROTECTION: Maintain the level of Methyl Chloride above those listed in Section 2 (Composition and Information on Ingredients) and maintain oxygen level above 19.5% in the workplace. Use supplied air respiratory protection during emergency response to a release of Methyl Chloride or if oxygen levels are below 19.5%. If respiratory protection is required, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) or equivalent State standards. The following NIOSH respiratory protection recommendations are for Methyl Chloride.

CONCENTRATION RESPIRATORY EQUIPMENT

At Any Detectable Concentration: Self-Contained Breathing Apparatus (SCBA) or positive pressure, full-faced Supplied Air Respirator (SAR) with an auxiliary SCBA.

Escape: Gas mask with organic vapor canister; or escape-type SCBA.

The IDLH concentration for Methyl Chloride is 2000 ppm.

EYE PROTECTION: Splash goggles or safety glasses, for protection from rapidly expanding gases.

HAND PROTECTION: Gloves resistant to tears should be worn when handling cylinders of Methyl Chloride. Chemical resistant gloves should be worn when using Methyl Chloride. Polyvinyl Alcohol gloves are recommended. Natural rubber and neoprene gloves can be dissolved after contact with Methyl Chloride.

BODY PROTECTION: Use body protection appropriate for task. An apron or coveralls may be necessary if splashes of liquid may be anticipated. Transfer of large quantities under pressure may require protective equipment appropriate to protect employees from gas spraying, as well as fire-retardant items.

9. PHYSICAL and CHEMICAL PROPERTIES

VAPOR DENSITY: 2.113 kg/m³ (0.1330 lb/ft³)

SPECIFIC GRAVITY (air = 1): 1.74

SOLUBILITY IN WATER: Slightly.

EVAPORATION RATE(n-BuAc): Not applicable.

ODOR THRESHOLD: 10 ppm

VAPOR PRESSURE (psia): 73.4

pH: Not applicable.

FREEZING POINT: -97.6°C (-143.9°F)

BOILING POINT @ 1 atm: -24.2°C (-11.6°F)

EXPANSION RATIO: Not applicable.

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

SPECIFIC VOLUME (ft³/lb): 7.6

APPEARANCE AND COLOR: Colorless, gas at room temperature, or colorless liquid under pressure, with ethereal odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no distinct warning properties. In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY

STABILITY: Normally stable in air. In the presence of moisture, Methyl Chloride hydrolyzes slowly forming hydrochloric acid

DECOMPOSITION PRODUCTS: At temperatures above 371°C (700°F), Methyl Chloride may decompose into toxic end products (hydrochloric acid, phosgene, chlorine, and carbon monoxide). Other decomposition products include: carbon monoxide, carbon dioxide and hydrogen chloride gas.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Methyl chloride is incompatible with the following materials: strong oxidizers, interhalogens (e.g., bromine trifluoride; bromine pentafluoride); magnesium and alloys; potassium and alloys; zinc. Potentially explosive reaction with aluminum when heated to 152°C (306°F) in a sealed container. The gas may ignite on contact with aluminum chloride or aluminum in any form.

HAZARDOUS POLYMERIZATION: Not expected to occur.

CONDITIONS TO AVOID: Contact with incompatible materials and exposure to heat, sparks and other sources of ignition. Cylinders exposed to high temperatures or direct flame can rupture or burst.

PART IV *Is there any other useful information about this material?*

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The information on the following page is for Methyl Chloride:

LD₅₀ (oral, rat) = 1800 mg/kg

LC₅₀ (inhalation, rat) = 5300 mg/m³/4H

LC₅₀ (inhalation, mouse) = 2200 ppm/6H

LC_{Lo} (inhalation, dog) = 14661 ppm/6H

LC_{Lo} (inhalation, guinea pig) = 20,000 ppm/2H

TC_{Lo} (inhalation, mouse) = 750 ppm/6H (female 6-17D post); teratogenic effects

TD_{Lo} (inhalation, rat) = 3000 ppm/6H (male 5D pre): reproductive effects

LC_{Lo} (inhalation, human) = 20000 ppm /2H:

eye, central nervous system, gastrointestinal effects

oms (human, lymphocyte) = 3 pph

sce (human, lymphocyte) = 3 pph

EYE IRRITATION: Rabbits exposed to pure Methyl Chloride for 90 seconds experienced only mild irritation. No effect was seen when rabbits were exposed to 250-465 ppm for 5 days.

ACUTE INHALATION EFFECTS: In short-term animal studies, central nervous system effects such as tremors, convulsions, incoordination, weakness of the limbs, and paralysis were seen. Vomiting, drooling and difficulty breathing were also noted. The development of these symptoms were delayed or gradual. A no effect level of 110 ppm for a single 4-hour exposure was determined. Repeated daily exposures (up to two weeks) at 500-4000 ppm were lethal. Brief exposures (30-60 minutes) to very high concentrations (greater than 4000 ppm) produced a narcotic effect and were also lethal. Examination of fatally exposed animals revealed brain, lung, liver and kidney damage.

CHRONIC INHALATION EFFECTS: The effects from long term exposure are essentially the same as those seen following high-level, short-term exposures (central nervous system, liver and kidney damage). Chronic exposure of guinea pigs, mice, rats and rabbits to concentration levels of 300 or 375 ppm did not produce any noticeable effects in two studies. In a Russian report, daily exposure of rats, and rabbits to concentrations of 115 ppm produced central nervous system effects, liver and kidney disorders. In another report, exposure to 115 ppm for 6 months did cause central nervous system effects, liver, kidney and blood problems.

SUSPECTED CANCER AGENT: Methyl Chloride is not found on the following lists: FEDERAL OSHA Z LIST, NTP, CALOSHA, and therefore is not considered, nor suspected to be a cancer-causing agent by these agencies. Methyl Chloride is listed and considered to be a carcinogenic agent by the agencies as follows:

IARC - Group 3: Not Classifiable as to Carcinogenicity to Humans

NIOSH-X: Carcinogen

MAK-B: Justifiably suspected of having carcinogenic potential.

IRRITANCY OF PRODUCT: Methyl Chloride is not irritating; however, contact with rapidly expanding gases can cause frostbite to exposed tissue.

SENSITIZATION TO THE PRODUCT: Methyl Chloride is not known to cause sensitization in humans.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of Methyl Chloride on the human reproductive system.

Mutagenicity: No human mutagenicity effects have been described for Methyl Chloride. A significant increase in kidney tumors was seen in male but not female mice, exposed daily to 1000 ppm Methyl Chloride, for two years. No carcinogenic effect was observed in mice exposed to lower concentrations (50-or 225 ppm), nor in rats similarly exposed.

Embryotoxicity: No human embryotoxicity effects have been described for Methyl Chloride. Refer to the following paragraph for additional information.

Teratogenicity: No human teratogenicity effects have been described for Methyl Chloride. Male rats exposed by inhalation to 3000 ppm for 6 hours/day, for 5 days, had significantly reduced fertility. Exposure to 1000 ppm had no effect on fertility. No other paternal toxicity was reported. In one study, exposure of male rats to 1000 ppm resulted in testicular damage, while, in another study, no testicular damage was seen in rats exposed to 50, 225, or 1000 ppm.

Reproductive Toxicity: There have been reports of decreased libido in humans after Methyl Chloride exposure. Methyl Chloride caused teratogenic effects (malformed newborns) in animals. Female mice exposed to 500-750 ppm on days 6-18 of pregnancy gave birth to pups with heart defects. Levels of 100-250 ppm had no effect. Maternal toxicity was observed at the 750 ppm level but not at the 500 ppm level.

*A **mutagen** is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generational lines. An **embryotoxin** is a chemical which causes damage to a developing embryo (i.e., within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A **teratogen** is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A **reproductive toxin** is any substance which interferes in any way with the reproductive process.*

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Conditions relating to the target organs may be aggravated by overexposures to Methyl Chloride. See Section 3 (Hazard Identification) for information on these conditions.

RECOMMENDATIONS TO PHYSICIANS: Physicians should not administer adrenaline as a stimulant in case of Methyl Chloride poisoning. Administer oxygen, if necessary. Treat symptoms and eliminate exposure.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for Methyl Chloride.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas will be dissipated rapidly in well-ventilated areas. Additional environmental information is available for Methyl Chloride as follows:

Biodegradation: Chlorinated methanes released 50-70% of bound CL when incubated anaerobically for 4-5 days with arable soil or sewage sludge. Methyl Chloride has a very low Kow (0.91), indicating that it does not tend to bioconcentrate in aquatic organisms.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: This gas can be harmful to animal life. Suspected toxic effect on a variety of test animals during clinical studies indicate adverse effects on the central nervous system, liver and kidney. No information currently available concerning adverse effects expected to occur to plant-life. Plants may be damaged by frost produced in the presence of rapidly expanding gases. Additional information is available for the effect of Methyl Chloride on plants, as follows:

Toxicity threshold determined for green algae (*Scenedesmus quadricauda*), using cell multiplication inhibition test = 1450 mg/L methyl chloride. Toxicity threshold determined for green algae (*Microcystis aeruginosa*), using cell multiplication inhibition test = 550 mg/L.

EFFECT OF CHEMICAL ON AQUATIC LIFE: Methyl Chloride may be harmful to aquatic life. Information is available for the effect of Methyl Chloride on aquatic life, as follows:

LC₅₀ (bluegill) = 550 ppm, 96 hours, static test

LC₅₀ (tidewater silversides, *Menidia beryllina*) = 270 ppm, 96 hours, static test

Effect level (protozoa, *Entosiphon sulcatum*) = 8000 mg/L, 72 hours

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Return cylinders with residual product to MESA Specialty Gases & Equipment. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Methyl Chloride
HAZARD CLASS NUMBER and DESCRIPTION: 2.1 (Flammable Gas)
UN IDENTIFICATION NUMBER: UN 1063
PACKING GROUP: Not Applicable
DOT LABEL(S) REQUIRED: FLAMMABLE GAS

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 115

MARINE POLLUTANT: Methyl Chloride is not classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

U.S. SARA REPORTING REQUIREMENTS: Methyl Chloride is subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

COMPONENT	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Methyl Chloride	NO	YES	YES

U.S. SARA THRESHOLD PLANNING QUANTITY: Not applicable.

U.S. CERCLA REPORTABLE QUANTITY (RQ): Methyl Chloride = 100 lb.

CANADIAN DSL/NDSL INVENTORY STATUS: Methyl Chloride is on the DSL Inventory.

U.S. TSCA INVENTORY STATUS: Methyl Chloride is listed on the TSCA Inventory.

15. REGULATORY INFORMATION (Continued)

OTHER U.S. FEDERAL REGULATIONS: Methyl Chloride is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 lb. Compliance with the OSHA Process Safety Standard (29 CFR 1910.119) may be applicable to operations involving the use of Methyl Chloride. Under this regulation Methyl Chloride is listed in Appendix A. The threshold quantity for Methyl Chloride under this regulation is 15,000 lb.

U.S. STATE REGULATORY INFORMATION: Methyl Chloride is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Methyl Chloride.

California - Permissible Exposure Limits for Chemical Contaminants: Methyl Chloride.

Florida - Substance List: Methyl Chloride.

Illinois - Toxic Substance List: Methyl Chloride.

Kansas - Section 302/313 List: Methyl Chloride.

Massachusetts - Substance List: Methyl Chloride.

Michigan Critical Materials Register: Methyl Chloride.

Minnesota - List of Hazardous Substances: Methyl Chloride.

Missouri - Employer Information/Toxic Substance List: Methyl Chloride.

New Jersey - Right to Know Hazardous Substance List: Methyl Chloride.

North Dakota - List of Hazardous Chemicals, Reportable Quantities: Methyl Chloride.

Pennsylvania - Hazardous Substance List: No.

Rhode Island - Hazardous Substance List: Methyl Chloride.

Texas - Hazardous Substance List: Methyl Chloride.

West Virginia - Hazardous Substance List: Methyl Chloride.

Wisconsin - Toxic and Hazardous Substances: Methyl Chloride.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): Methyl Chloride is not on the California Proposition 65 lists.

LABELING:

DANGER:

FLAMMABLE LIQUID AND GAS UNDER PRESSURE.
CAN FORM EXPLOSIVE MIXTURES WITH AIR.
MAY CAUSE LUNG, LIVER, KIDNEY AND CENTRAL NERVOUS SYSTEM DAMAGE.
MAY CAUSE IRRITATION TO EYES, SKIN, AND MUCOUS MEMBRANES.
MAY CAUSE FROSTBITE.

Avoid breathing gas.
Keep away from heat, flames, and sparks.
Store and use with adequate ventilation.
Cylinder temperature should not exceed 52°C (125°F)
Do not get liquid in eyes, on skin or clothing.
Close valve after each use and when empty.
Use in accordance with the Material Safety Data Sheet.

NOTE:

Suck-back into cylinder may cause rupture.
Always use a back flow preventative device in piping.

FIRST-AID: IN CASE OF CONTACT, immediately flush eyes or skin with water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse. (Discard contaminated shoes)

IN CASE OF FROSTBITE, obtain immediate medical attention.

DO NOT REMOVE THIS PRODUCT LABEL.

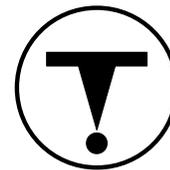
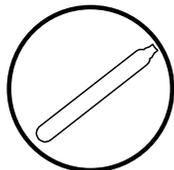
CANADIAN WHMIS SYMBOLS:

Class A: Compressed Gases

Class B1: Flammable Gas

Class D1A: Toxic Material/Immediate and Serious Effects

Class D2B: Other Toxic Effects



16. OTHER INFORMATION

The information contained herein is based on data considered accurate. However, no warranty is expressed or implied regarding the accuracy of these data or the results to be obtained from the use thereof. MESA Specialty Gases & Equipment. assumes no responsibility for injury to the vendee or third persons proximately caused by the material if reasonable safety procedures are not adhered to as stipulated in the data sheet. Additionally, MESA Specialty Gases & Equipment .assumes no responsibility for injury to vendee or third persons proximately caused by abnormal use of the material even if reasonable safety procedures are followed. Furthermore, vendee assumes the risk in his use of the material.

DEFINITIONS OF TERMS

A large number of abbreviations and acronyms appear on a MSDS. Some of these which are commonly used include the following:

CAS #: This is the Chemical Abstract Service Number which uniquely identifies each constituent. It is used for computer-related searching.

EXPOSURE LIMITS IN AIR:

ACGIH - American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. **TLV** - Threshold Limit Value - an airborne concentration of a substance which represents conditions under which it is generally believed that nearly all workers may be repeatedly exposed without adverse effect. The duration must be considered, including the 8-hour Time Weighted Average (**TWA**), the 15-minute Short Term Exposure Limit, and the instantaneous Ceiling Level (**C**). Skin absorption effects must also be considered.

OSHA - U.S. Occupational Safety and Health Administration. **PEL** - Permissible Exposure Limit - This exposure value means exactly the same as a TLV, except that it is enforceable by OSHA. The OSHA Permissible Exposure Limits are based in the 1989 PELs and the June, 1993 Air Contaminants Rule (Federal Register: 58: 35338-35351 and 58: 40191). Both the current PELs and the vacated PELs are indicated. The phrase, "Vacated 1989 PEL," is placed next to the PEL which was vacated by Court Order.

IDLH - Immediately Dangerous to Life and Health - This level represents a concentration from which one can escape within 30-minutes without suffering escape-preventing or permanent injury. **The DFG - MAK** is the Republic of Germany's Maximum Exposure Level, similar to the U.S. PEL. **NIOSH** is the National Institute of Occupational Safety and Health, which is the research arm of the U.S. Occupational Safety and Health Administration (**OSHA**). NIOSH issues exposure guidelines called Recommended Exposure Levels (**RELs**). When no exposure guidelines are established, an entry of **NE** is made for reference.

HAZARD RATINGS:

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM: Health Hazard: **0** (minimal acute or chronic exposure hazard); **1** (slight acute or chronic exposure hazard); **2** (moderate acute or significant chronic exposure hazard); **3** (severe acute exposure hazard; onetime overexposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime overexposure can be fatal). Flammability Hazard: **0** (minimal hazard); **1** (materials that require substantial pre-heating before burning); **2** (combustible liquid or solids; liquids with a flash point of 38-93°C [100-200°F]); **3** (Class IB and IC flammable liquids with flash points below 38°C [100°F]); **4** (Class IA flammable liquids with flash points below 23°C [73°F] and boiling points below 38°C [100°F]. Reactivity Hazard: **0** (normally stable); **1** (material that can become unstable at elevated temperatures or which can react slightly with water); **2** (materials that are unstable but do not detonate or which can react violently with water); **3** (materials that can detonate when initiated or which can react explosively with water); **4** (materials that can detonate at normal temperatures or pressures).

NATIONAL FIRE PROTECTION ASSOCIATION: Health Hazard: **0** (material that on exposure under fire conditions would offer no hazard beyond that of ordinary combustible materials); **1** (materials that on exposure under fire conditions could cause irritation or minor residual injury); **2** (materials that on intense or continued exposure under fire conditions could cause temporary incapacitation or possible residual injury); **3** (materials that can on short exposure could cause serious temporary or residual injury); **4** (materials that under very short exposure causes death or major residual injury).

NATIONAL FIRE PROTECTION ASSOCIATION (Continued): Flammability Hazard and Reactivity Hazard: Refer to definitions for "Hazardous Materials Identification System".

FLAMMABILITY LIMITS IN AIR:

Much of the information related to fire and explosion is derived from the National Fire Protection Association (**NFPA**). Flash Point - Minimum temperature at which a liquid gives off sufficient vapors to form an ignitable mixture with air. Autoignition Temperature: The minimum temperature required to initiate combustion in air with no other source of ignition. LEL - the lowest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source. UEL - the highest percent of vapor in air, by volume, that will explode or ignite in the presence of an ignition source.

TOXICOLOGICAL INFORMATION:

Possible health hazards as derived from human data, animal studies, or from the results of studies with similar compounds are presented. Definitions of some terms used in this section are: **LD₅₀** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC₅₀** - Lethal Concentration (gases) which kills 50% of the exposed animals; **ppm** concentration expressed in parts of material per million parts of air or water; **mg/m³** concentration expressed in weight of substance per volume of air; **mg/kg** quantity of material, by weight, administered to a test subject, based on their body weight in kg. Data from several sources are used to evaluate the cancer-causing potential of the material. The sources are: **IARC** - the International Agency for Research on Cancer; **NTP** - the National Toxicology Program, **RTECS** - the Registry of Toxic Effects of Chemical Substances, **OSHA** and **CAL/OSHA**. IARC and NTP rate chemicals on a scale of decreasing potential to cause human cancer with rankings from 1 to 4. Subrankings (2A, 2B, etc.) are also used. Other measures of toxicity include **TDLo**, the lowest dose to cause a symptom and **TCLo** the lowest concentration to cause a symptom; **TDo**, **LDLo**, and **LDo**, or **TC**, **TCo**, **LCLo**, and **LCo**, the lowest dose (or concentration) to cause lethal or toxic effects. **BEI** - Biological Exposure Indices, represent the levels of determinants which are most likely to be observed in specimens collected from a healthy worker who has been exposed to chemicals to the same extent as a worker with inhalation exposure to the TLV. Ecological Information: EC is the effect concentration in water.

REGULATORY INFORMATION:

This section explains the impact of various laws and regulations on the material. **EPA** is the U.S. Environmental Protection Agency. **WHMIS** is the Canadian Workplace Hazardous Materials Information System. **DOT** and **TC** are the U.S. Department of Transportation and the Transport Canada, respectively. Superfund Amendments and Reauthorization Act (**SARA**); the Canadian Domestic/Non-Domestic Substances List (**DSL/NDL**); the U.S. Toxic Substance Control Act (**TSCA**); Marine Pollutant status according to the **DOT**; the Comprehensive Environmental Response, Compensation, and Liability Act (**CERCLA** or **Superfund**); and various state regulations.