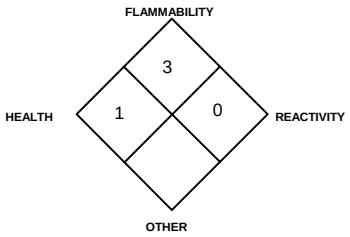
MATERIAL SAFETY DATA SHEET

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

NFPA RATING



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

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: **METHANOL - CH_3OH**
Document Number: Methanol

PRODUCT USE: For general analytical/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 10, 1999

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	OTHER
Methanol	67-56-1	100%	200, Skin	250	200	250 (Vacated 1989 PEL)	6000	NIOSH REL: TWA: 200, Skin STEL: 250 DFG MAK: 200

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: Methanol is a clear, colorless, mobile, flammable liquid with a strong alcohol odor. Inhalation of Methanol's vapors can irritate the upper respiratory system and cause central nervous system depression (producing symptoms such as headaches, drowsiness, and confusion). Inhalation, skin contact or ingestion of Methanol may cause blindness and liver damage. Inhalation of high concentrations of the vapors may be fatal. Direct skin or eye contact may be irritating. Vapors of Methanol are heavier than air and may spread long distances; distant ignition and flashback are possible. Methanol is not reactive. Emergency responders must wear the proper personal protective equipment (and have appropriate fire-suppression equipment) suitable for the situation to which they are responding.

HAZARDOUS MATERIAL INFORMATION SYSTEM

HEALTH	(BLUE)	1
FLAMMABILITY	(RED)	3
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

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The most significant routes of occupational overexposure are by inhalation, skin and eye contact. The symptoms of overexposure to Methanol are as follows:

INHALATION: Inhalation of Methanol vapors will cause central nervous system depression. The symptoms of such exposure can include headaches, nausea, dizziness, drowsiness, confusion, and unconsciousness. Irritation of the nose, throat, and other tissues of the upper respiratory system may also occur. There are reports that inhalation overexposures can cause blindness and liver damage. Other symptoms, similar to those described under "Ingestion", may also develop. Severe inhalation overexposures may be fatal.

CONTACT WITH SKIN or EYES: Contact of the liquid with the eyes may cause redness and pain. Direct contact with the skin (especially after prolonged overexposure) can cause irritation. Prolonged or repeated skin overexposures can cause dermatitis.

SKIN ABSORPTION: Skin absorption is a potential route of overexposure for Methanol. Severe cases of skin overexposure can result in blindness and liver damage. Overexposure can also result in other symptoms described under "Ingestion".

INGESTION: Methanol is toxic by ingestion. The fatal dose in man is between 2 and 8 ounces. Death may be prompt, but it is usually delayed for several days and the mortality rate is high. Ingestion of Methanol will cause visual disturbances, central nervous system depression, anorexia, leg cramps, vertigo, restlessness, nausea, vomiting, abdominal or back pain, apathy, and coma. One of the characteristic symptoms of Methanol poisoning is visual disturbance, including dimness of vision with dilated pupils which react poorly to light. The eyes are often sensitive to pressure, and eye movements are painful. Permanent blindness may also result. Acidosis may also occur, as a result of methanol oxidation to formic acid; this acidosis can severely reduce the body's alkali reserves.

INJECTION: Injection is not anticipated to be a significant route of overexposure for Methanol. If Methanol is "injected" (as may occur through punctures by contaminated, sharp objects), local swelling and irritation can occur. Depending on the degree of injection overexposure, symptoms described under "Ingestion" may develop.

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**.

ACUTE: Inhalation of Methanol vapors can irritate the upper respiratory system and cause central nervous system depression (producing symptoms such as headaches, drowsiness, and confusion). Inhalation, skin contact or ingestion of Methanol may cause blindness and liver damage. Inhalation of high concentrations of the vapors or ingestion may be fatal. Direct skin or eye contact may be irritating.

CHRONIC: Prolonged or repeated skin overexposures can cause dermatitis. Chronic inhalation of Methanol vapors can cause permanent blindness and liver damage. Refer to Section 11 (Toxicology Information) for additional information.

TARGET ORGANS: Skin, eyes, central nervous system.

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

4. FIRST-AID MEASURES

SKIN EXPOSURE: If Methanol contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 15 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek medical attention if any adverse reaction occurs.

EYE EXPOSURE: If Methanol liquid or vapors enter the eyes, open victim's eyes while under gentle running water. Use sufficient force to open eyelids. Have victim "roll" eyes. Minimum flushing is for 15 minutes. Victim must seek immediate medical attention.

INHALATION: If vapors, mists, or sprays of Methanol are inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Remove or cover gross contamination to avoid exposure to rescuers.

INGESTION: If Methanol is swallowed, CALL PHYSICIAN OR POISON CONTROL CENTER FOR MOST CURRENT INFORMATION. If professional advice is not available, do not induce vomiting. Victim should drink milk, egg whites, or large quantities of water. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow.

Victims of chemical exposure must be taken for medical attention. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with victim. Physicians should refer to Section 11 (Toxicological Information) for additional information on the treatment of Methanol poisoning.

5. FIRE-FIGHTING MEASURES

FLASH POINT (TCC): 12°C (54°F)

AUTOIGNITION TEMPERATURE: 470°C (878°F)

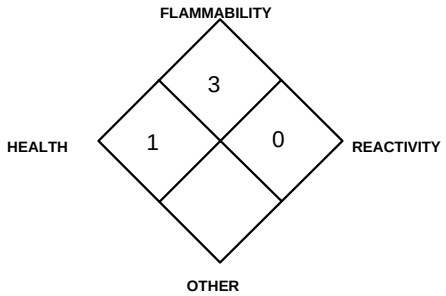
FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): 6.0%
Upper (UEL): 36.5%

FIRE EXTINGUISHING MATERIALS:

Water Spray: YES
Foam: YES
Halon: YES
Carbon Dioxide: YES
Dry Chemical: YES
Other: Any "B" Class.

NFPA RATING



See Section 16 for Definition of Ratings

UNUSUAL FIRE AND EXPLOSION HAZARDS: This is a Class IB flammable liquid. When involved in a fire, this material will ignite and produce toxic gases (including carbon monoxide, carbon dioxide, and formaldehyde). Methanol burns with a non-luminous, bluish flame. The vapors of Methanol are heavier than air and may spread long distances. Distant ignition and flash-back are possible.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Static discharge may cause Methanol to ignite.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Water spray can be used to cool fire-exposed containers. Water fog or spray can also be used by trained fire-fighters to disperse Methanol's vapors and to protect personnel. If this liquid is involved in a fire, fire runoff water should be contained to prevent possible environmental damage. If necessary, decontaminate fire-response equipment with soap and water solution.

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.

In the event of a non-incidental release, minimum Personal Protective Equipment should be **Level B: triple-gloves (rubber gloves and nitrile gloves, over latex gloves), chemical resistant suit and boots, hard-hat, and Self-Contained Breathing Apparatus.** Monitor the surrounding area for combustible vapor levels, Methanol, and oxygen. Combustible vapor concentration must also be below 10% of the LEL (6.0% for Methanol) prior to entry. The concentration of Methanol must be below the limits indicated in Section 2 (Composition and Information on Ingredients) and the atmosphere must have at least 19.5 percent oxygen before personnel can be allowed in the area without Self-Contained Breathing Apparatus and other protective equipment.

6. ACCIDENTAL RELEASE MEASURES (Continued)

SPILL AND LEAK RESPONSE (continued): There is a colorimetric tube available for Methanol. If a colorimetric tube is used during spill response, the reading must not be above background levels before non-emergency personnel are allowed into the release area.

Eliminate all sources of ignition before clean-up operations begin. Use non-sparking tools. Absorb spilled liquid with activated carbon, polypads or other suitable absorbent materials. Prevent material from entering sewer or confined spaces. Decontaminate the area thoroughly. Place all spill residue in an appropriate container and seal. Dispose of in accordance with Federal, State, and local hazardous waste disposal regulations (see Section 13, Disposal Considerations).

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 Methanol ON YOU or IN YOU. Wash hands after handling chemicals. Do not eat or drink while handling chemicals. Remove contaminated clothing immediately. Be aware of any signs of effects of exposure indicated in Section 3 (Hazard Identification); exposures to fatal concentrations of Methanol could occur rapidly.

STORAGE AND HANDLING PRACTICES: All employees who handle this material should be trained to handle it safely. Avoid breathing vapors or mists generated by Methanol. Use in a well-ventilated location. Cylinders of Methanol must be properly labeled. If Methanol is used in other types of containers, only use portable containers and dispensing equipment (faucet, pump, drip can) approved for flammable liquids. Post “NO SMOKING” signs, where appropriate in storage and use areas.

Store cylinders of Methanol in a cool, dry location, away from direct sunlight, sources of intense heat, or where freezing is possible. Do not allow area where cylinders are stored to exceed 52°C (125°F). Material should be stored in secondary containers, or in a diked area, as appropriate. Store containers away from incompatible chemicals. Keep container tightly closed when not in use. Storage areas should be made of fire-resistant materials. Inspect all incoming containers before storage, to ensure containers are properly labeled and not damaged.

Empty containers may contain residual flammable liquid or vapors. Therefore, empty containers should be handled with care. Do not expose ”empty” containers to welding touches, or any other source of ignition.

SPECIAL PRECAUTIONS FOR HANDLING CYLINDERS: Protect cylinders of Methanol against physical damage. If appropriate, cylinders should be stored in an up-right position. Cylinders should 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 situations in which cylinders are being used:

Before Use: If appropriate, 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 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. Mark empty cylinders “EMPTY”.

NOTE: Use only DOT or ASME code containers. Earth-ground and bond all lines and equipment associated with Methanol. 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 Bulletin SB-2 “*Oxygen Deficient Atmospheres*”.

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. Always use Methanol in areas where adequate ventilation is provided. Decontaminate equipment using soapy water before maintenance begins. Collect all rinsates and dispose of according to applicable Federal, State, or local procedures.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Use a mechanical fan or vent area to outside. Where appropriate, use a non-sparking, grounded ventilation system separate from other exhaust ventilation systems. Ensure eyewash/safety shower stations are available near areas where Methanol is used.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION (Continued)

RESPIRATORY PROTECTION: Maintain airborne contaminant concentrations below exposure limits listed in Section 2 (Composition and Information on Ingredients), if applicable. If respiratory protection is needed, use only protection authorized in 29 CFR 1910.134, or applicable State regulations. Use supplied air respiration protection if oxygen levels are below 19.5%. For additional information, the following NIOSH recommendations for respiratory protection are provided for Methanol.

CONCENTRATION	RESPIRATORY EQUIPMENT
Up to 2000 ppm:	Supplied Air Respirator (SAR).
Up to 5000 ppm	SAR operated in continuous-flow mode.
Up to 6000 ppm:	Tight-fitting SAR operated in continuous-flow mode, full facepiece Self-Contained Breathing Apparatus (SCBA), or full facepiece SAR.
Emergency or Planned Entry into Unknown Concentration or IDLH Conditions:	Positive pressure, full facepiece SCBA or positive pressure, full facepiece SAR with an auxiliary positive pressure SCBA.
Escape:	Escape-type SCBA should be used.

The IDLH concentration for Methanol is 6000 ppm.

EYE PROTECTION: Splash goggles or safety glasses.

HAND PROTECTION: Wear Nitrile or Viton gloves for routine industrial use. Use triple gloves for spill response, as stated in Section 6 (Accidental Release Measures) of this MSDS.

BODY PROTECTION: Use body protection appropriate for task. Coveralls, chemically-resistant boots, and other body protection may be appropriate, depending on the operation in which Methanol is used.

9. PHYSICAL and CHEMICAL PROPERTIES

RELATIVE VAPOR DENSITY (air = 1): 1.11
SPECIFIC GRAVITY(water = 1): 0.79
SOLUBILITY IN WATER: Soluble.
EVAPORATION RATE (n-BuAc=1): 2.0
EXPANSION RATIO: Not applicable.
VAPOR PRESSURE: 500 mm Hg, 25°C
LOG COEFFICIENT WATER/OIL DISTRIBUTION: -0.77

pH: Not applicable.
FREEZING/MELTING POINT: -97.8°C (-144°F)
BOILING POINT: 64.5°C (148°F)
ODOR THRESHOLD: Human Odor Perception: 4.3 mg/m^3
SPECIFIC VOLUME: Not applicable.

APPEARANCE AND COLOR: Methanol is a clear, colorless, mobile liquid with a strong alcohol odor.

HOW TO DETECT THIS SUBSTANCE (warning properties): The odor may be a distinctive characteristic of Methanol.

10. STABILITY and REACTIVITY

STABILITY: Stable at standard temperatures and pressures.

DECOMPOSITION PRODUCTS: When ignited in air, the products of thermal decomposition include carbon monoxide, carbon dioxide, and formaldehyde.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Methanol is incompatible with strong oxidizing agents, acids, acid chlorides, acid anhydrides, reducing agents, and alkali metals (e.g., sodium and lithium). Explosive reaction with chloroform + sodium methoxide, diethyl zinc. Violent reaction with alkyl aluminum salts, acetyl bromide, chloroform + sodium hydroxide, chromium (VI) oxide, cyanuric chloride, (iodine + ethanol + mercury (II) oxide), phosphorus trioxide, (potassium hydroxide + chloroform), nitric acid. Incompatible with beryllium dihydride, metals (e.g., potassium, magnesium), potassium tert-butoxide, carbon tetrachloride + metals (e.g., aluminum, magnesium, zinc), dichloromethane.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials and exposure to heat, sparks and other sources of ignition.

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

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicology data are for Methanol.

Skin Irritancy (rabbit) 500 mg/ 24 hours; moderate
Eye Irritancy (rabbit) 40 mg; moderate
DNA Inhibition System (lymphocyte, human) 300 mmol/L

Microsomal Mutagenicity Assay (lymphocyte, mouse) 7900 mg/L
TDLo (oral, rat) = 7500 mg/kg; reproductive effects
TCLo (inhalation, rat) = 10000 ppm/ 7 hours, teratogenic effects

TOXICITY DATA (continued):

LDLo (oral, man) = 6422 mg/kg; central nervous system, pulmonary, gastrointestinal effects
TCLo (inhalation, human) = 86000 mg/m^3; eye, pulmonary effects
TCLo (inhalation, human) = 300 ppm; eye, central nervous system, pulmonary effects
LD_{50} (oral, rat) = 5628 mg/kg
LC_{50} (inhalation, rat) = 64000 ppm/4 hours
LD_{50} (intraperitoneal, rat) = 7529 mg/kg
LD_{50} (intravenous, rat) = 2131 mg/kg
LD_{50} (oral, mouse) = 7300 mg/kg
LD_{50} (intraperitoneal, mouse) = 10765 mg/kg
LD_{50} (subcutaneous, mouse) = 9800 mg/kg
LD_{50} (intravenous, mouse) = 4710 mg/kg
TDLo (oral, man) = 3429 mg/kg; eye effects
LDLo (oral, human) = 428 mg; central nervous system, pulmonary effects
LDLo (oral, human) = 143 mg/kg; eye, pulmonary, gastrointestinal effects
TDLo (oral, woman) = 4000 mg/kg; eye, pulmonary, gastrointestinal effects
LD_{50} (dermal, rabbit) = 20000 mg/kg
LDLo (oral, monkey) = 7000 mg/kg
LCLo (inhalation, monkey) = 1000 ppm
LDLo (skin, monkey) = 393 mg/kg

SUSPECTED CANCER AGENT: Methanol is not found on the following lists: FEDERAL OSHA Z LIST, NTP, IARC, or CAL/OSHA, and is therefore not considered to be, nor suspected to be, a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: The liquid or vapors of Methanol can be irritating to contaminated tissue.

SENSITIZATION OF PRODUCT: Methanol is not known to cause sensitization in humans after prolonged or repeated exposures.

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

Mutagenicity: Human mutation data are available for Methanol; these data were obtained from studies in which specific human cells were exposed to relatively high concentrations of this compound.
Embryotoxicity: Methanol is not reported to cause embryotoxic effects in humans.
Teratogenicity: Methanol is not reported to cause teratogenic effects in humans. Teratogenicity data are available from clinical studies of test animals.
Reproductive Toxicity: Methanol is not reported to cause adverse reproductive effects in humans. Reproductive toxicity data are available from clinical studies of test animals.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation 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: Acute or chronic respiratory conditions, central nervous system conditions, eye disorders, or skin problems may be aggravated by overexposure to Methanol.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate exposure. If necessary, administer liver function tests, and eye and vision exams. The following treatment for Methanol poisoning is summarized from "Clinical Toxicology of Commercial Chemical Products (Fifth Edition, 1985).

- Gastric lavage with 3-5% sodium bicarbonate, leaving some solution in the stomach after the lavage.
- Ethanol treatment is designed to produce and sustain an ethanol blood level of about 100 mg/dL.
- Give 4 gm by mouth or stomach tube until the arterial blood pH is normal. Even when fully corrected, it is important to note that acidosis may occur at any time during the first several days.
- Oxygen and artificial ventilation should be provided if respiration becomes weak or insufficient.
- Protect patient's eyes from light.
- Morphine may be given for abdominal pain (unless respiration is depressed).
- Dextrose, saline, and sodium bicarbonate may be administered intravenously.
- Hemodialysis can be done in severe cases in which the alkali treatment may be delayed or is incomplete.
- Leucovorin calcium injections (2 mg/kg; i.m. @ 0, 4, 8, 12 and 18 hours) may be expected to reverse the course of alcohol poisoning.

BIOLOGICAL EXPOSURE INDICES: The following Biological Exposure Indices (BEIs) are associated with Methanol:

CHEMICAL DETERMINANT	SAMPLING TIME	BEI
METHANOL Methanol in urine	End of shift	15 mg/L

12. ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: Methanol will be degraded over time into other organic compounds. The following environmental data are available for Methanol:

METHANOL: log K_{ow} = -0.77. Water Solubility = Miscible. BOD (g/g) = 0.76-1.12 standard dilution/sewage seed. Methanol occurs naturally as a plant volatile and during microbial degradation of biological wastes. When released on land or water, it is apt to volatilize and biodegrade. The estimated half-life in water is 5.3 hours to 2.6 days. Methanol is highly mobile in soil The Bioconcentration Factor for Methanol is 2.0.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Methanol may be harmful or fatal to contaminated plant and animal-life (especially if large quantities of Methanol are released). Refer to section 11 (Toxicological Information) for additional information on effects on animals. The following data are available for plant life:

METHANOL:
Cuticle-water distribution coefficient for the cuticle membrane of *Citrum aurantium*: - 1.11
Cuticle-water distribution coefficient for the cuticle membrane of *Brassica olaracea*: 2.74
Leaf-air distribution coefficient for the whole leaf of *Brassica olaracea*: 3.66

EFFECT OF CHEMICAL ON AQUATIC LIFE: Methanol can be harmful or fatal to contaminated aquatic plant and animal life. The following aquatic toxicity data are available for Methanol:

LC_{50} (*Pimephales promelas,* fathead minnow) = 29,400 mg/L/ 96 hours
EC_0 (*Pseudomonas putida*, bacteria) = 6,600 mg/L/ 16 hours
EC_0 (*Microcystis aeruginosa*, algae) = 530 mg/L/ 8 days
EC_0 (*Scenedesmus quadricauda*) = 8,000 mg/L/ 7 days
LD_0 (*Scenedesmus*, algae) = 10,000 mg/L
EC_0 (*Entosiphon sulcatum*, protozoa) > 10,000 mg/L/ 72 hours
EC_0 (*Uronema parduczi* Chatton-Lwoff, protozoa) > 10,000 mg/L
LD_0 (*Colpoda*, protozoa) = 1,250 mg/L
NOEC (*Daphnia*, crustaceans) = 10,000 mg/L/ 48 hours
EC_{50} (*Daphnia magna* Straus, crustaceans) > 10,000 mg/L/ 24 hours
LC_{50} (*Artemia salina*, crustaceans) > 10,000 mg/L/ 24 hours
LC_{50} (trout) = 8,000 mg/L/ 48 hours
LC_0 (creek chub) = 8,000 mg/L/ 24 hours
LC_{100} (creek chub) = 17,000 mg/L/ 24 hours
LC_{50} (*Salmo gairdneri*, fish) = 20,100 mg/L/ 96 hours
EC_{50} (*Salmo gairdneri*, fish) = 13,000 mg/kg/ 96 hours
LC_{50} (*Lepomis macrochirus*, fish) = 15,400 mg/L/ 96 hours
EC_{50} (*Lepomis macrochirus*, fish) = 12,700 mg/L/ 96 hours
LC_{50} (*Alburnus alburnus*, fish) = 28,000 mg/L/ 96 hours
LC_{50} (*Nitocra spinipes*) = 12,000 mg/L/ 96 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:	Methanol
HAZARD CLASS NUMBER and DESCRIPTION:	3 (Flammable Liquid)
UN IDENTIFICATION NUMBER:	UN 1230
PACKING GROUP:	PG II
DOT LABEL(S) REQUIRED:	Flammable Liquid

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 131

MARINE POLLUTANT: Methanol 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 following information for the preparation of Canadian Shipments. Additional Hazard Class for Methanol is: 6.1 (Toxic Liquid).

15. REGULATORY INFORMATION

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

CHEMICAL NAME	SARA 302 (40 CFR 355, Appendix A)	SARA 304 (40 CFR Table 302.4)	SARA 313 (40 CFR 372.65)
Methanol	NO	YES	YES

15. REGULATORY INFORMATION (Continued)

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

U.S. CERCLA REPORTABLE QUANTITIES (RQ): 5000 lb.

CANADIAN DSL/NDSL INVENTORY STATUS: Methanol is listed on the Canadian DSL Inventory.

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

OTHER U.S. FEDERAL REGULATIONS: Depending on specific operations involving the use of Methanol, the regulations of the Process Safety Management of Highly Hazardous Chemicals may be applicable (29 CFR 1910.119). Under this regulation, Methanol is not listed in Appendix A; however, any process that involves a flammable liquid on-site, in one location, in quantities of 10,000 lb (4,553 kg) or greater is covered under this regulation unless it is used as a fuel.

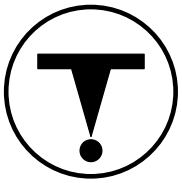
U.S. STATE REGULATORY INFORMATION: Methanol is covered under specific State regulations, as denoted below:

Alaska - Designated Toxic and Hazardous Substances: Methanol.
California - Permissible Exposure Limits: Methanol.
Florida - Substance List: Methanol.
Illinois - Toxic Substance List: Methanol.
Kansas - Section 302/313 List: Methanol.
Minnesota - List of Hazardous Substances: Methanol.
Massachusetts - Substance List: Methanol.
Michigan - Critical Materials Register: No.
Missouri - Employer Information/Toxic Substance List: Methanol.
New Jersey - Right to Know Hazardous Substance List: Methanol.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: Methanol.
Pennsylvania - Hazardous Substance List: Methanol.
Rhode Island - Hazardous Substance List: Methanol.
Texas - Hazardous Substance List: Methanol.
West Virginia - Hazardous Substance List: Methanol.
Wisconsin - Toxic and Hazardous Substances: Methanol.

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

LABELING: **WARNING!** FLAMMABLE LIQUID AND VAPOR. PROLONGED OR REPEATED SKIN CONTACT MAY DRY SKIN AND CAUSE IRRITATION. HARMFUL OR FATAL IF SWALLOWED. CAN CAUSE CENTRAL NERVOUS SYSTEM EFFECTS, BLINDNESS OR LIVER DAMAGE. CAN CAUSE DEATH IF TOO MUCH VAPOR IS BREATHED. Keep away from heat, sparks and flame. Keep container closed. Use only with adequate ventilation. Avoid contact with skin and clothing. Avoid exposure to vapor. Wash thoroughly after handling. FIRST-AID: In case of contact, immediately flush skin with plenty of water. Remove contaminated clothing and shoes. Get medical attention if irritation develops or persists. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. If swallowed, do not induce vomiting. Get medical attention. IN CASE OF FIRE: Use water fog, foam, dry chemical, or CO_2. IN CASE OF SPILL: Absorb spill with inert materials (e.g. activated carbon, dry sand). Flush residual spill with water. Consult Material Safety Data Sheet for additional information.

CANADIAN WHMIS SYMBOLS: **Class B2**: Flammable Liquid
Class D1A: Poisonous and Toxic Material
Class D2A/D2B: Materials Causing 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**. 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. **O**ccupational **S**afety and **H**ealth **A**dministration (**OSHA**). NIOSH issues exposure guidelines called **R**ecommended **E**xposure **L**evels (**REL**s). 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 could cause death or major residual injury). 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 **N**ational **F**ire **P**rotection **A**ssociation (**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: **LD_{50}** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC_{50}** - 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/m^3** 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 death. **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.

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 Substances List (DSL)**; the U.S. **Toxic Substance Control Act (TSCA)**; Marine Pollutant status according to the **DOT**; California's Safe Drinking Water Act (**Proposition 65**); the **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA or Superfund)**; and various state regulations. This section also includes information on the precautionary warnings which appear on the materials package label.