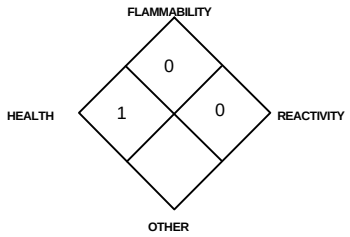
NFPA RATING



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: **ARGON: 1-90%; CARBON DIOXIDE: 1-2.5%; HELIUM: Balance**

TRADE NAME/SYNONYMS: **Shield-Rite SHIELDING GASES:**
Shield-Rite S/S; Shield-Rite 69/30/1; Shield-Rite TRIMIX
Above mixtures of:
Carbon Dioxide 1.0-2.5%, Argon, 1.0-90.0%, Helium, Balance
Document Number: 000035

PRODUCT USE: Analytical/synthetic chemical use.
SUPPLIER/MANUFACTURER'S NAME: Quimby Corporation
ADDRESS: 1603 NW 14th Ave

Portland, OR 97209

BUSINESS PHONE: (503)221-1100
EMERGENCY PHONE: INFOTRAC: 1-800-535-5053

DATE OF PREPARATION: September 5, 1996
FIRST REVISION: June 16, 2000

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 ppm
Argon	7440-37-1	1.0-90.0%	There are no specific exposure limits for Argon. Argon is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					
Carbon Dioxide	124-38-9	1.0-2.50%	5000	30,000	5000 10,000 (Vacated 1989 PEL)	30,000 (Vacated 1989 PEL)	40,000	DFG-MAK: 5000 NIOSH REL: TWA =10000 STEL = 30000
Helium	7440-59-7	Balance	There are no specific exposure limits for Helium. Helium is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					

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: This product is a colorless, odorless, non-flammable gas. The main health hazard associated with releases of this gas is the effect of Carbon Dioxide. At concentrations between 2-10%, Carbon Dioxide (a component of this gas mixture) can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. If the concentration of Carbon Dioxide reaches 10% or more, suffocation can occur within minutes. Moisture in the air could lead to the formation of carbonic acid, which can be irritating to the eyes. Asphyxiation by displacement of oxygen may also occur. Emergency responders must wear proper personal protective equipment, including Self-Contained Breathing Apparatus, when responding to releases of this material.

SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE: The most significant route of overexposure for this gas mixture is by inhalation. The following paragraphs describe symptoms of exposure by route of exposure.

INHALATION: Carbon Dioxide is an asphyxiant and a powerful cerebral vasodilator. If the concentration of Carbon Dioxide reaches 10% or more, suffocation can occur rapidly. Inhalation of concentrations between 2 and 10% can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. Carbon Dioxide initially stimulates respiration and then causes respiratory depression. Inhalation of low concentrations (3-5%) have no known permanent harmful effects. Symptoms in humans at various levels of concentration are as follows:

CONCENTRATION	**SYMPTOMS OF EXPOSURE**
1%:	Slight increase in breathing rate.
2%:	Breathing rate increases to 50% above normal; exposure cause headache, tiredness.
3%:	Breathing increases to twice normal rate and becomes labored. Weak narcotic effect. Impaired hearing, headache, increase in blood pressure and pulse rate.
4-5%:	Breathing increases to approximately four times normal rate, symptoms of intoxication become evident and slight choking may be felt.
5-10%:	Characteristic sharp odor noticeable. Very labored breathing, headache, visual impairment and ringing in the ears. Judgment may be impaired, followed by loss of consciousness.
> 10%	Unconsciousness occurs more rapidly above 10% level.

HAZARDOUS MATERIAL INFORMATION SYSTEM

HEALTH	(BLUE)	1
FLAMMABILITY	(RED)	0
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		B

EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8

For routine industrial applications

See Section 16 for Definition of Ratings

High concentrations of this gas can also cause an oxygen-deficient environment. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. The skin of a victim of overexposure may have a blue color. Under some circumstances of overexposure, death may occur.

OTHER POTENTIAL HEALTH EFFECTS: Contact with 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 contact with liquid can quickly subside. Moisture in the air could lead to the formation of carbonic acid (from the Carbon Dioxide gas present in this product), which can be irritating to the eyes.

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

ACUTE: Inhaling high concentrations of this gas mixture can lead to coma or death. At low concentrations of this gas mixture, inhalation can cause nausea, dizziness, visual disturbances, shaking, headache, mental confusion, sweating, increased heartbeat, and elevated blood pressure and respiratory rate, due to the effects of Carbon Dioxide or oxygen deficiency. High concentrations of the gas mixture may cause eye irritation or damage. Contact with rapidly expanding gases (which are released under high pressure) may cause frostbite.

3. HAZARD IDENTIFICATION (Continued)

CHRONIC: Reversible effects on the acid-base balance in the blood, blood pressure, and circulatory system may occur after prolonged exposure to elevated Carbon Dioxide levels. See Section 11 (Toxicological Information) for additional information.

TARGET ORGANS: Respiratory system, cardiovascular system, eyes.

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 THIS PRODUCT WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus Personal Protective equipment should be worn.

Remove victim(s) to fresh air, as quickly as possible. In case of eye contact which leads to irritation, immediately flush eyes with copious amounts of water for at least 15 minutes. If not breathing, give artificial respiration If breathing is difficult, give oxygen. 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

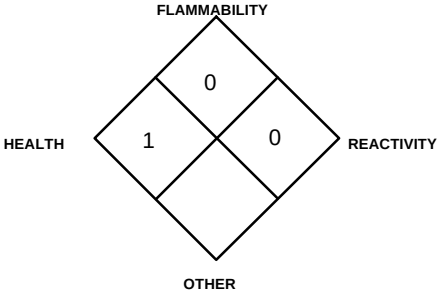
FLASH POINT: Not applicable.
AUTOIGNITION TEMPERATURE: Not applicable.
FLAMMABLE LIMITS (in air by volume, %):
Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: Non-flammable, inert gas. Use extinguishing media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Although the mixture is non-flammable, it can present minor health hazards to firefighters. This gas mixture does not burn; however, containers, when involved in fire, may rupture in the heat of the fire.

Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

NFPA RATING



See Section 16 for Definition of Ratings

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Move fire-exposed cylinders from area, if it can be done without risk to firefighters. Withdraw immediately in case of rising sounds from venting safety devices or any discoloration of tanks or cylinders due to a fire.

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.

Minimum Personal Protective Equipment should be **Level B: protective clothing, mechanically-resistant gloves and Self-Contained Breathing Apparatus**. Locate and seal the source of the leaking gas. Allow the gas to dissipate. Monitor the surrounding area for Carbon Dioxide and oxygen levels. Colorimetric tubes are available for Carbon Dioxide. The levels of Carbon Dioxide must be below those listed 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. 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.

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 this product IN YOU. Do not eat or drink while handling chemicals. Be aware of any signs of effects of exposure indicated in Section 3 (Hazard Identification); exposures to fatal concentrations of the components of this gas mixture 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. 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, fireproof area, away from flammable materials and corrosive atmospheres. Store away from heat and ignition sources and out of direct sunlight. Do not store near elevators, corridors or loading docks.

Do not allow area where cylinders are stored to exceed 52°C (125°F). Store cylinders of this product away from incompatible chemicals. Do not store containers where they can come into contact with moisture. 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 safety devices in valves and cylinders. The following rules are applicable to 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 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. 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*".

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.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation. Local exhaust ventilation is preferred, because it prevents dispersion of this gas mixture into the work place by eliminating it at its source. If appropriate, install automatic monitoring equipment to detect the level of oxygen.

RESPIRATORY PROTECTION: Maintain Carbon Dioxide levels below those listed in Section 2 (Composition and Information on Ingredients) and oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if Carbon Dioxide levels are above the IDLH (40,000 ppm), during emergency response to a release of this product, 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. Respiratory selection guidelines from NIOSH for Carbon Dioxide are provided below for further information on respiratory protection.

CONCENTRATION	**RESPIRATORY EQUIPMENT**
UP TO 40,000 ppm:	Supplied Air Respirator (SAR); or full-facepiece Self-Contained Breathing Apparatus (SCBA).
EMERGENCY OR PLANNED ENTRY INTO UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS:	Positive pressure, full-facepiece SCBA; or positive pressure, full-facepiece SAR with an auxiliary positive pressure SCBA.
ESCAPE:	Escape-type SCBA.
NOTE:	The IDLH concentration for Carbon Dioxide is 40,000 ppm.

EYE PROTECTION: Splash goggles, face-shields or safety glasses.

HAND PROTECTION: Wear mechanically-resistant gloves when handling cylinders of this product.

BODY PROTECTION: Use body protection appropriate for task.

9. PHYSICAL and CHEMICAL PROPERTIES

The following information is pertinent for Argon, a main component of this gas mixture.

GAS DENSITY: 1.650 kg/m^3 (0.103 lb/ft^3)
SPECIFIC GRAVITY (air = 1): 1.380
SOLUBILITY IN WATER v/v @ 20°C (68°F): 3.37%
VAPOR PRESSURE: Not applicable.
COEFFICIENT WATER/OIL DISTRIBUTION: Log P = 0.94
SPECIFIC VOLUME (ft^3/lb): 9.7
EVAPORATION RATE (nBuAc = 1): Not applicable.
FREEZING POINT: -189.2°C (-308.9°F)
BOILING POINT @ 1 atm: -185.9°C (-302.6°F)
ODOR THRESHOLD: Not applicable.
pH: Not applicable.
EXPANSION RATIO: Not applicable

The following information is pertinent for Carbon Dioxide, a main component of this gas mixture.

SPECIFIC GRAVITY (gas) @ 21°C (70°F): 1.52
SOLUBILITY IN WATER @ 20°C (68°F): 0.90%
SPECIFIC VOLUME (ft^3/lb): 8.8
TRIPLE POINT @ 60.4 psig (416 kPa): -56.6°C (-69.9°F)
pH @ 1 atm: 3.7 (carbonic acid)
FREEZING POINT: -56.6°C (-69.9°F)
VAPOR PRESSURE (psia): 844.7
ODOR THRESHOLD: Not applicable.
EXPANSION RATIO: Not applicable.
EVAPORATION RATE (nBuAc = 1): Not applicable
GAS DENSITY @ 21°C (70°F), 1 atm: 0.1144 lb/ft^3 (1.833 kg/m^3)
BOILING POINT @ 1 atm (sublimation point): -78.5°C (-109.3°F)
COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

The following information is pertinent for Helium, a main component of this gas mixture.

GAS DENSITY @ 21.1°C (70°F): 0.165 kg/m^3 (0.0103 lb/ft^3)
SPECIFIC GRAVITY (air = 1): 0.1381
SOLUBILITY IN WATER v/v @ 0°C (32°F): 0.0094
VAPOR PRESSURE: Not applicable.
COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.
SPECIFIC VOLUME (ft^3/lb): 96.7
EVAPORATION RATE (nBuAc = 1): Not applicable.
FREEZING POINT: Not applicable.
BOILING POINT @ 1 atm: -268.9°C (-452.1°F)
ODOR THRESHOLD: Not applicable.
pH: Not applicable.
EXPANSION RATIO: Not applicable.

The following information is pertinent to this gas mixture.

APPEARANCE AND COLOR: This product is a colorless, odorless gas.
HOW TO DETECT THIS SUBSTANCE (warning properties): There are no unusual warning properties associated with a release of this product.

10. STABILITY and REACTIVITY

STABILITY: Normally stable, inert gas.

DECOMPOSITION PRODUCTS: Carbon Dioxide gas (a component of this product) in an electrical discharge yields carbon monoxide and oxygen. In the presence of moisture, Carbon Dioxide will form carbonic acid.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Carbon Dioxide (a component of this product) will ignite and explode when heated with powdered aluminum, beryllium, cerium alloys, chromium, magnesium-aluminum alloys, manganese, thorium, titanium, and zirconium. In the presence of moisture, Carbon Dioxide will ignite with cesium oxide. Metal acetylides will also ignite and explode on contact with Carbon Dioxide. The remainder of the components of this product are inert.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Avoid exposing cylinders to extremely high temperatures, which could cause the cylinders to rupture. Avoiding exposing this product to incompatible chemicals.

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

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following data are for the components of this gas mixture.

Argon: Standard animal toxicity values are not available. Male rats were exposed for 6 days to 20% oxygen and 80% Argon at 1 atmosphere ambient pressure. No significant changes in blood cell counts or bone marrow were observed. Other animal studies concern the deficiency of (hypoxia) or the narcotic effects of various pressures of Argon, the effects of increased Argon pressures on the central nervous system and decompression sickness.

Eyes: Argon gas injected into the anterior (front) chamber of the eyes of rabbits caused no injury and was reabsorbed at about the same rate as air.

11. TOXICOLOGICAL INFORMATION (Continued)

TOXICITY DATA (continued):

Carbon Dioxide: This gas is an asphyxiant gas with physiological effects at high concentrations.

LCL_o (inhalation, human) = 9 pph/5 minutes. LCL_o (inhalation, mammal) = 90000 ppm/5 minutes. TCL_o (inhalation, rat) = 6 pph/24 hours; reproductive and teratogenic effects.

Helium: There are no specific toxicology data for Helium. Helium is a simple asphyxiant, which acts to displace oxygen in the environment.

SUSPECTED CANCER AGENT: The components of this gas mixture are not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC, and therefore are not considered to be, nor suspected to be cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: Contact with rapidly expanding gases can cause frostbite and damage to exposed skin and eyes. Moisture in the air could lead to the formation of carbonic acid (due to the Carbon Dioxide in the mixture), and irritate the eyes.

SENSITIZATION OF PRODUCT: The components of this gas mixture are not known to be sensitizers upon prolonged or repeated exposure.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: This product is not expected to cause mutagenic effects in humans.
Embryotoxicity: This product is not expected to cause embryotoxic effects.
Teratogenicity: This product is not expected to cause teratogenic effects in humans. Clinical studies involving test animals exposed to high concentrations of Carbon Dioxide (a component of this product) indicate teratogenic effects (i.e., cardiac and skeletal malformations, stillbirths).
Reproductive Toxicity: This product is not expected to cause adverse reproductive effects in humans. Clinical studies involving test animals exposed to high concentrations of Carbon Dioxide (a component of this product) indicate reproductive effects (i.e., changes in testes).

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: Disorders involving the "Target Organs" (see Section 3, Hazard Information) may be aggravated by overexposure to this product.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

BIOLOGICAL EXPOSURE INDICES: Currently there are no Biological Exposure Indices (BEIs) associated with the components of this product.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: The components of this gas mixture occur naturally in the atmosphere. The gas will be dissipated rapidly in well-ventilated areas. The following environmental data are applicable to the components of this product.

CARBON DIOXIDE: Food chain concentration potential: None. Biological Oxygen Demand: None

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to oxygen-deficient environments. No adverse effect is anticipated to occur to plant-life, except for frost produced in the presence of rapidly expanding gases.

EFFECT OF CHEMICAL ON AQUATIC LIFE: The following aquatic toxicity data are available for the components of this product.

CARBON DIOXIDE:
Aquatic toxicity: 100-200 mg/l/no time specified/various organisms/fresh water.
Waterfowl toxicity: Inhalation 5-8%, no effect.

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 Quimby Corporation. Do not dispose 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:	Compressed gases, n.o.s. (Argon, Carbon Dioxide, Helium)
HAZARD CLASS NUMBER and DESCRIPTION:	2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER:	UN 1956
PACKING GROUP:	Not Applicable
DOT LABEL(S) REQUIRED:	Non-Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2000): 126

MARINE POLLUTANT: The components of this gas mixture are 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 GAS MIXTURE IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

U.S. SARA REPORTING REQUIREMENTS: This product is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act.

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

U.S. CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

CANADIAN DSL/NDSL INVENTORY STATUS: The components of this gas mixture are listed on the DSL Inventory.

U.S. TSCA INVENTORY STATUS: The components of this gas mixture are on the TSCA Inventory.

OTHER U.S. FEDERAL REGULATIONS: Not applicable.

U.S. STATE REGULATORY INFORMATION: The components of this gas mixture are covered under the following specific State regulations:

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

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): The components of this gas mixture are not on the California Proposition 65 lists.

LABELING (Precautionary Statements):

CAUTION:
HIGH PRESSURE GAS.
CAN CAUSE RAPID SUFFOCATION.
CAN INCREASE RESPIRATION AND HEART RATE.
MAY CAUSE FROSTBITE.
Avoid breathing gas.
Store and use with adequate ventilation.
Cylinder temperature should not exceed 52°C (125°F)
Use equipment rated for cylinder pressure.
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.

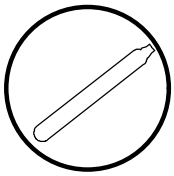
15. REGULATORY INFORMATION (Continued)

LABELING (Precautionary Statements) (continued):

FIRST-AID: **IF INHALED**, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

IN CASE OF FROSTBITE, obtain immediate medical attention.
DO NOT REMOVE THIS PRODUCT LABEL.

CANADIAN WHMIS SYMBOLS: **Class A:** Compressed Gas



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. **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 causes 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 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: **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 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/NDSL)**; 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.