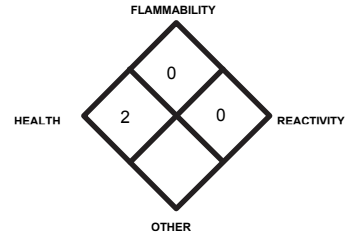


# MATERIAL SAFETY DATA SHEET

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

A Division of Fresno Oxygen / Barnes Welding Supply

NFPA RATING



## 1. PRODUCT IDENTIFICATION

**CHEMICAL NAME; CLASS:**

**NON-FLAMMABLE GAS MIXTURE**

**BAR - 90ET, - 90ET(LR), - 90ET(MR),  
BAR - 84, BAR - 97, BAR - 97W/NO(LR),  
BAR - 97(HR),  
BAR - 97W/NO(High & Low Range)**

**DOCUMENT NUMBER:**

BARMIX1

**MIXTURE DESCRIPTION:**

B.A.R. Gas Calibration Mixtures

**PRODUCT USE:**

For general analytical/synthetic chemical uses.

**SUPPLIER/MANUFACTURER'S NAME:**

SPECIALTY AIR TECHNOLOGIES, INC.

**ADDRESS:**

6544 1/2 CHERRY AVENUE  
LONG BEACH, CA 90805

**BUSINESS PHONE:**

1-562-984-7230

**EMERGENCY PHONE:**

1-800-535-5053

**International:**

1-352-323-3500

**DATE OF PREPARATION:**

June 1, 1999

**REVISION DATE:**

January 4, 2005

## 2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					OTHER ppm
			ACGIH		OSHA			
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	
Carbon Monoxide	630-08-0	0.1 - 12.5	25	NE	50 35 (Vacated 1989 PEL)	200 (Vacated 1989 PEL)	1200	NIOSH REL: 35 TWA: 200 C DFG MAK: 30
Carbon Dioxide	124-38-9	1.0 - 15	5000	30,000	5000	30,000 (Vacated 1989 PEL)	40,000	DFG-MAK: 5000 NIOSH REL: TWA = 10000 STEL = 30000
NOx (Nitrogen Oxides, except for Nitrous Oxide)  The following exposure limit are for Nitric Oxide	10102-43-9	1-9999 ppm	25	NE	25	NE	100	NIOSH REL: TWA = 25 ppm
Nitrogen	7727-37-9	Balance	There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					

NE = Not Established

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 gas mixture. Exposure to Carbon Monoxide (a component of this gas mixture) is harmful in relatively low concentrations, and severe over-exposures can cause headaches, nausea, collapse, and death. At concentrations between 2-10%, Carbon Dioxide (another component of this gas mixture) can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate. Another significant hazard associated with releases of this gas mixture is oxygen deprivation (i.e. dizziness, breathing rate increase). Contact with rapidly expanding gases may cause frostbite. Emergency responders must wear personal protective equipment appropriate for the situation to which they are responding.

**SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE:** The most significant route of over-exposure for this product is by inhalation. The following paragraphs describe the symptoms of over-exposure to this gas mixture.

**INHALATION:** One of this most significant hazards associated with this gas mixture is the potential for over-exposure to Carbon Monoxide. Inhalation of can be harmful in relatively low concentrations. Severe over-exposures may be fatal. Effects of exposure to Carbon Monoxide can be summarized as follows:

<b>CONCENTRATION</b>	<b>SYMPTOM OF EXPOSURE</b>
All exposure levels:	Over-exposure to Carbon Monoxide can be indicated by the lips and fingernails turning red.
200 ppm:	Slight symptoms (headache, discomfort) after several hours of exposure.
400 ppm:	Headache and discomfort experienced within 2-3 hours of exposure.
1,000 -2000 ppm:	Within 30 minutes, slight palpitations of the heart occurs. Within 1.5 hours, there is a tendency to stagger. Within 2 hours, there is mental confusion, headaches, and nausea.
200-2500 ppm:	Unconsciousness within 30 minutes.
>2500 ppm:	Potential for collapse and death before warning symptoms are produced.

<b>HAZARDOUS MATERIAL INFORMATION SYSTEM</b>			
<b>HEALTH</b>		(BLUE)	2
<b>FLAMMABILITY</b>		(RED)	0
<b>REACTIVITY</b>		(YELLOW)	0
<b>PROTECTIVE EQUIPMENT</b>			B
EYES	RESPIRATORY	HANDS	BODY
	See Section 8		See Section 8
For routine industrial applications			

Additionally, if the concentration of Carbon Dioxide (a component of this gas mixture) reaches 10% or more, suffocation can occur within minutes. At concentrations between 2-10%, Carbon Dioxide can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate.

This gas mixture can also cause symptoms of oxygen deprivation (asphyxiation) when present in high enough concentrations to significantly lower oxygen concentration. 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. Under some circumstances of over-exposure, death may occur. The effects associated with various levels of oxygen are as follows:

<b>CONCENTRATION</b>	<b>SYMPTOM OF EXPOSURE</b>
12-16% Oxygen:	Breathing and pulse rate increased, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea and vomiting, collapse or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

**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 such contact can quickly subside.

### 3. HAZARD IDENTIFICATION (Continued)

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in **Lay Terms**. Over-exposure to this product may cause the following health effects:

**ACUTE:** Carbon Monoxide, a component of this product, is can be harmful in inhaled in relatively low concentrations. Symptoms of over-exposure can include respiratory difficulty, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, and, at high concentrations, unconsciousness or death may occur. Carbon Monoxide over-exposure is often indicated by the lips and fingernails turning cherry-red. Over-exposure to Carbon Dioxide can also cause health effects (especially changes in breathing and pulse rates). This gas mixture can also presents a health hazard by displacing the oxygen in the atmosphere. 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.

**CHRONIC:** Clinical studies indicate that there is a relationship between exposure to Carbon Monoxide, a component of this product, in specific occupations (i.e. fire-fighters, foundry workers) and an increased incidence of cardiovascular problems. Additionally, Carbon Monoxide is a reproductive toxin. Refer to Section 11 (Toxicological Information) of this MSDS for further information.

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### 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 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).

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### 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 gas. Use extinguishing media appropriate for surrounding fire.

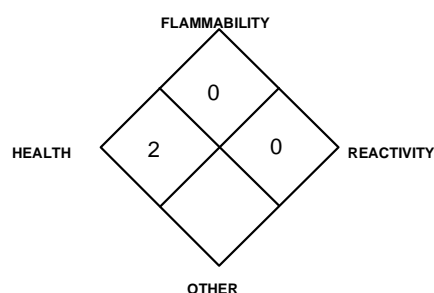
UNUSUAL FIRE AND EXPLOSION HAZARDS: This gas mixture does not burn; however, containers, when involved in fire, may rupture in the heat of the fire. This gas mixture contains a chemical asphyxiant and irritants (Carbon Monoxide, Nitrogen Oxides) in high enough concentrations to present a potential health hazard to firefighters.

Explosion Sensitivity to Mechanical Impact: Not Sensitive.

Explosion Sensitivity to Static Discharge: Not Sensitive.

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

#### NFPA RATING



**See Section 16 for Definition of Ratings**

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## 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 Oxygen, Carbon Monoxide, and Carbon Dioxide levels. 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. Carbon Monoxide and Carbon Dioxide readings should be no higher than background level before non-emergency personnel are allowed to enter area. 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.

**Note:** Colorimetric tubes are available for Carbon Monoxide and Carbon Dioxide.

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## 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 dizziness or fatigue; exposures to fatal concentrations of this product could occur without any significant warning symptoms. All work operations should be monitored in such a way that emergency personnel can be immediately contacted in the event of a release.

**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 cylinders of this gas mixture away from incompatible materials.

**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. 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. Earth-ground and bond all lines and equipment associated with this product. 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. Purge gas handling equipment with inert gas (i.e. nitrogen) before attempting repairs. Always use product in areas where adequate ventilation is provided.

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## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

**VENTILATION AND ENGINEERING CONTROLS:** Use with adequate ventilation to ensure compliance with exposure limits described in Section 2 (Composition and Information on Ingredients). 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 and level of Carbon Monoxide. Eye wash stations/safety showers should be near areas where this product is used or stored.

**RESPIRATORY PROTECTION:** Maintain concentration of Carbon Monoxide below those listed in Section 2 (Composition and Information on Ingredients) in the workplace. Use supplied air respiratory protection if oxygen levels are below 19.5% or during emergency response to a release of this product. If respiratory protection is needed, use only protection authorized in the U.S. Federal OSHA Standard (29 CFR 1910.134), applicable U.S. State regulations, or the appropriate standards of Canada and its Provinces. Use supplied air respiration protection if oxygen levels are below 19.5% or are unknown. The following are NIOSH recommendations for Carbon Monoxide and Nitric Oxide concentrations in air and are provided for further information:

### **CONCENTRATION**

UP TO 350 ppm:

UP TO 875 ppm:

UP TO 1200 ppm:

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: Gas mask with canister to protect against carbon monoxide or escape-type SCBA.

NOTE: End of Service Life Indicator (ESLI) required for gas masks. The IDLH concentration for Carbon Monoxide is 1200 ppm.

### **RESPIRATORY EQUIPMENT for CARBON MONOXIDE**

Supplied Air Respirator (SAR).

SAR operated in a continuous flow mode.

Gas mask with canister to protect against carbon monoxide or full-facepiece Self-Contained Breathing Apparatus (SCBA) or full-facepiece SAR.

### **CONCENTRATION**

Up to 100 ppm:

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: Gas mask with canister to protect against nitric oxide; or escape-type SCBA.

NOTE: The IDLH concentration for Nitric Oxide is 100 ppm.

### **RESPIRATORY EQUIPMENT FOR NITRIC OXIDE**

SAR (Supplied-Air Respirator) operated in a continuous-flow mode; or full-facepiece chemical cartridge respirator with cartridge(s); or powered air-purified respirator with cartridge(s); or gas mask with canister; or SAR; or full-facepiece SCBA..

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

**HAND PROTECTION:** Wear mechanically-resistant gloves when handling cylinders of this product. Wear chemically-resistant gloves when using this gas mixture. Butyl rubber, chlorinated polyethylene, neoprene nitrile, and polyvinyl rubber are recommended.

**BODY PROTECTION:** Use body protection appropriate for task.

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## 9. PHYSICAL and CHEMICAL PROPERTIES

The following information is for Nitrogen, the main component of this product, unless otherwise stated:

**VAPOR DENSITY:** 1.145 kg/m<sup>3</sup>

**SPECIFIC GRAVITY (air = 1):** 0.967

**SOLUBILITY IN WATER:** 1.49% (v/v)

**EXPANSION RATIO:** Not applicable

**ODOR THRESHOLD:** Not applicable. Odorless.

**COEFFICIENT WATER/OIL DISTRIBUTION:** Not applicable.

**EVAPORATION RATE (nBuAc = 1):** Not applicable.

**FREEZING POINT:** -210°C (-345.8°F)

**BOILING POINT (@ 1 atmos.):** ; -195.8°C (-320.4 °F)

**pH:** Not applicable.

**VAPOR PRESSURE (psia):** Not applicable.

**SPECIFIC VOLUME (ft<sup>3</sup>/lb):** 13.8

The following information is pertinent to this product:

**APPEARANCE AND COLOR:** This product is a colorless, odorless gas mixture.

**HOW TO DETECT THIS SUBSTANCE (warning properties):** There are no unusual warning properties associated with a release of this product. 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.

The following information is pertinent for Nitrogen, the main component of this gas mixture.

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## 10. STABILITY and REACTIVITY

**STABILITY:** Normally stable.

**DECOMPOSITION PRODUCTS:** The components of this gas mixture do not decompose, per se, but can react with other compounds if exposed to extremely high temperatures.

**MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE.** Nitrogen, a component of this mixture, is not compatible with lithium and titanium. Carbon Monoxide (another component of this gas mixture) is incompatible with the following substances: metal oxides, nickel, iron, chromium, alkali and alkaline earth metals, aluminum powder, iodine heptafluoride, sulfur, bromine, bromine trifluoride, bromine pentafluoride, chlorine dioxide, peroxodisulfuryl difluoride. can act to initiate and sustain the combustion of flammable materials (especially when oxygen levels are above 23.5%). Though not likely to occur as a result of releases of this product, atmospheres containing high levels of 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. Nitrogen Oxides are generally not compatible with the following materials: flammable or combustible materials, charcoal. powdered metals, oxidizing and reducing agents, halogens, a variety of halocarbons.

**HAZARDOUS POLYMERIZATION:** Will not 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. Avoiding exposing this product to incompatible chemicals.

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## 11. TOXICOLOGICAL INFORMATION

**TOXICITY DATA:** The following toxicology data are for the components of this gas mixture present at a level greater than 1 mole %:

**CARBON MONOXIDE:**

TCLo (inhalation, mouse) = 65 ppm/24 hours (7-18 preg): reproductive effects

TCLo (inhalation, mouse) = 8 pph/1 hour (female 8D post): teratogenic effects

TCLo (inhalation, human) = 600 mg/m<sup>3</sup>/10 minutes

LCLo (inhalation, man) = 4000 ppm/30 minutes

TCLo (inhalation, man) = 650 ppm/45 minutes: central nervous system and blood system effects.

LCLo (inhalation, human) = 5000 ppm/5 minutes

LCLo (inhalation, dog) = 4000 ppm/46 minutes

LCLo (inhalation, rabbit) = 4000 ppm

LC50 (inhalation, guinea pig) = 5718 ppm/4 hours

LCLo (inhalation, mammal) = 5000 ppm/5 minutes

LD50 (inhalation, wildbird) = 1334 ppm

**NITROGEN OXIDE (Representing Nitrogen Oxides)**

Mutation in Microorganisms-Salmonella typhimurium 30 ppm

Mutation in Mammalian Somatic Cells-Rat-Inhalation 27 ppm/3 hours

Mutation in Mammalian Somatic Cells-Hamster: lung 10 ppm/10 minutes, Continuous

Inhalation-Rat LC<sub>50</sub>: 1068 mg/m<sup>3</sup>

Inhalation-Mouse LCLo: 320 ppm

Inhalation-Dog, adult LCLo: 5000 ppm/25 minutes

Inhalation-Rat TCLo: 50 mg/m<sup>3</sup>/6H/7 weeks, Intermittent

**CARBON DIOXIDE:** This gas is an asphyxiant gas with physiological effects at high concentrations.

Inhalation-Rat TCLo: 6 pph/24 Hour (10D preg):Reproductive effects

Inhalation-Rat TCLo: 6 pph/24 Hour (10D preg):Teratogenic effects

Inhalation-Human LCLo: 9 pph/5 Minute

Inhalation-Mammal LCLo: 90,000 ppm/5 Minute

**NITROGEN:**

Eye Irritation (rabbit): Liquid Nitrogen poured into the eye for one or two seconds with the lids held apart, produced no discernible injury. When the exposure was extended to five seconds, slight lesions of the cornea were observed. By the next day, all eyes were entirely normal.

**SUSPECTED CANCER AGENT:** The components of this gas mixture are not found on the following lists: U.S. 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:** This gas mixture is moderately to severely irritating to contaminated tissue. Contact with rapidly expanding gases can cause frostbite and damage to exposed skin and eyes.

**SENSITIZATION OF PRODUCT:** The components of this gas mixture are not skin, respiratory, or cardiac sensitizers upon prolonged or repeated contact. One study involving guinea pigs exposed to 4.3 ppm Nitric Oxide, 8 hours/day for 5 days enhanced an allergic reaction to ovalbumin (a known allergen).

**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 reported to cause mutagenic effects in humans. Animal mutation data are available for Carbon Monoxide (a component of this product) obtained during studies on specific animal tissues exposed to high doses of this compound. Nitric Oxide (representative of Nitrogen Oxides) has been shown to cause genetic damage in bacterial studies.

**Embryotoxicity:** This product is not reported to cause embryotoxic effects in humans.

**Teratogenicity:** This product is not reported to cause teratogenic effects in humans. Studies on test animals exposed to relatively high doses of Carbon Monoxide (a component of this product) indicate teratogenic effects. Teratogenic data are available for Carbon Dioxide (a component of these product); these data were obtained during clinical studies on test animals exposed to relatively high doses.

**Reproductive Toxicity:** This product is not reported to cause adverse reproductive effects in humans. Nitric Oxide (as representative of Nitrogen Oxides) has been shown to cause and fetal toxicity in animal studies. Reproductive toxicity data are available for Carbon Dioxide (a component of these product); these data were obtained during clinical studies on test animals exposed to relatively high doses.

*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, as well as disorders involving the "Target Organs", as listed in Section 3 (Hazard Information), may be aggravated by overexposure to the components of this product.

**RECOMMENDATIONS TO PHYSICIANS:** Administer oxygen as soon as possible, following exposure. **In case of severe exposure to Carbon Monoxide:** Administer hyperbaric oxygen. Avoid administering stimulant drugs. **In case of severe exposure to Nitrogen Oxides:** If possible, have victim breathe as deeply and rapidly as possible to help flush gas from the lungs. Enforce bed rest for 24 - 48 hours, whether or not symptoms have appeared. Start oxygen therapy at the first sign of symptoms. Provide medication to reduce anxiety and dyspnea, as needed. Keep respiratory tract clear of mucous and exudate. Atropine, epinephrine, expectorants, emetics, most sedatives and most cardiac glycosides are usually ineffective and possibly harmful. Surgical intervention to assist breathing may be necessary. Respiratory infection should be controlled as soon as it is detected. Prednisone has been reported to be effective during recovery, in amounts of 3-8 x 10<sup>-6</sup> kg daily, in divided doses. If contamination irritates the eye, use an optic anesthetic. The victim should be examined by an ophthalmologist.

**BIOLOGICAL EXPOSURE INDICES:** Biological Exposure Indices (BEIs) associated with the components of this product are as follows:

**ACGIH BIOLOGICAL EXPOSURE INDICES:** ACGIH Biological Exposure Indices (BEIs) associated with the components of this product are as follows:

BIOLOGICAL EXPOSURE INDICES (BEIs) for components of this product are as follows:		
CHEMICAL DETERMINANT	SAMPLING TIME	BEI
CARBON MONOXIDE • Carboxy hemoglobin in blood • Carbon monoxide in end-exhaled air	• End of shift • End of shift	• 3.5% of hemoglobin • 20 ppm

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## 12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: This gas mixture will be dissipated rapidly in well-ventilated areas. Complex reactions of the Nitrogen Oxide components in this gas mixture occur in the atmosphere, which contribute to air pollution. Additional environmental data for the components of this product are available as follows:

**CARBON MONOXIDE:** Water solubility = 3.3 ml/100 cc at 0 °C, 2.3 mL at 20°C. The presence of more than a trace of carbon monoxide is a hazard to fish. Carbon Monoxide is harmful to all aquatic life in low concentrations.

**NITROGEN:** Log  $K_{ow}$  = 0.92; Water solubility = 1.49% v/v (25°C, 1 atm.).

EFFECT OF MATERIAL ON PLANTS or ANIMALS: Any adverse effect on animals would be related to Carbon Monoxide overexposure, as well as exposure to the Nitrogen Oxides. Refer to Section 11 (Toxicology Information) for the product's components effects on test animals. Due to exposure to Nitrogen Oxides, respiratory system irritation, and potential damage to animal tissue may occur. Because Nitrogen Oxides may produce corrosive nitrogen dioxide upon contact with air or moisture, plants may be damaged or destroyed. Additionally, frost produced in the presence of rapidly expanding gases may adversely affect plant life.

EFFECT OF CHEMICAL ON AQUATIC LIFE: Carbon Monoxide is harmful to aquatic life in low concentrations. Nitrogen Oxides, components of this gas mixture, hydrolyze to nitrogen dioxide when in contact with water. If a release of this gas mixture occurs near a other body of water, the release has the potential to kill fish and other aquatic life.

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## 13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations or with regulations of Canada and its Provinces. Return cylinders with residual product to Specialty Air Technologies, Inc. Do not dispose of locally.

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## 14. TRANSPORTATION INFORMATION

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

<u>PROPER SHIPPING NAME:</u>	Compressed gases, n.o.s., (Nitrogen, Carbon Monoxide)
<u>HAZARD CLASS NUMBER and DESCRIPTION:</u>	2.2 (Non-Flammable Gas)
<u>UN IDENTIFICATION NUMBER:</u>	UN1956
<u>PACKING GROUP:</u>	Not applicable
<u>DOT LABEL(S) REQUIRED:</u>	Non-Flammable Gas

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 126

MARINE POLLUTANT: The components of this gas mixture are not classified by the DOT as Marine Pollutants (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.

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## 15. REGULATORY INFORMATION

**U.S. SARA REPORTING REQUIREMENTS:** The components of this gas mixture are 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)
Carbon Monoxide	NO	NO	NO
Carbon Dioxide	NO	NO	NO
NITRIC OXIDE (Representing Nitrogen Oxides)	YES	YES	NO
Nitrogen	NO	NO	NO

**U.S. SARA THRESHOLD PLANNING QUANTITY:** Nitric Oxide: 100 lb.

**U.S. CERCLA REPORTABLE QUANTITY (RQ):** Nitrogen Oxide: 10 lb.

**TSCA INVENTORY STATUS:** The components of this gas mixture are listed on the TSCA Inventory.

**CERCLA REPORTABLE QUANTITY (RQ):** Not applicable.

**OTHER U.S. FEDERAL REGULATIONS:** Not applicable.

**U.S. STATE REGULATORY INFORMATION:** The components of this gas mixture are covered under specific State regulations, as denoted below:

**Alaska - Designated Toxic and Hazardous Substances:** Carbon Monoxide, Carbon Dioxide, Nitric Oxide.

**California - Permissible Exposure Limits for Chemical Contaminants:** Nitrogen, Carbon Monoxide, Carbon Dioxide, Nitric Oxide.

**Florida - Substance List:** Carbon Monoxide, Carbon Dioxide, Nitric Oxide.

**Illinois - Toxic Substance List:** Carbon Monoxide, Carbon Dioxide, Nitric Oxide.

**Kansas - Section 302/313 List:** Nitric Oxide.

**Michigan - Critical Materials Register:** None.

**Minnesota - List of Hazardous Substances:** Carbon Monoxide, Carbon Dioxide, Nitric Oxide.

**Massachusetts - Substance List:** Carbon Monoxide, Nitric Oxide.

**Missouri - Employer Information/Toxic Substance List:** Carbon Monoxide, Carbon Dioxide, Nitric Oxide.

**New Jersey - Right to Know Hazardous Substance List:** Nitrogen, Carbon Monoxide, Carbon Dioxide, Nitric Oxide.

**North Dakota - List of Hazardous Chemicals, Reportable Quantities:** Nitric Oxide.

**Pennsylvania - Hazardous Substance List:** Nitrogen, Carbon Monoxide, Carbon Dioxide, Nitric Oxide.

**Rhode Island - Hazardous Substance List:** Nitrogen, Carbon Monoxide, Carbon Dioxide, Nitric Oxide.

**Texas - Hazardous Substance List:** Carbon Monoxide, Nitric Oxide.

**West Virginia - Hazardous Substance List:** Nitric Oxide, Carbon Monoxide.

**Wisconsin - Toxic and Hazardous Substances:** Nitric Oxide, Carbon Monoxide.

**CALIFORNIA PROPOSITION 65:** Carbon Monoxide is on the California Proposition 65 lists as a chemical known to the State of California to cause birth defects or other reproductive harm.

**LABELING (For Compressed Gas):**

**DANGER:**

ODORLESS, HIGH PRESSURE GAS.  
MAY BE FATAL IF INHALED.  
CAN CAUSE LUNG DAMAGE.  
CAUSES EYE AND SKIN IRRITATION.  
SYMPTOMS MAY BE DELAYED.  
ACTS ON BLOOD, CAUSING DAMAGE TO CENTRAL NERVOUS SYSTEM.  
CAN BE FATAL EVEN WITH ADEQUATE OXYGEN.  
MAY CAUSE FROSTBITE.  
CAN CAUSE RAPID SUFFOCATION.

Avoid breathing gas.

Store and use with adequate ventilation.

Keep away from heat, flames, and sparks.

Do not get liquid in eyes, or on skin or clothing.

Cylinder temperature should not exceed 125 °F ( 52 °C).

Use equipment rated for cylinder pressure.

Close valve after each use and when empty.

Use in accordance with the Material Safety Data Sheet.

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## 15. REGULATORY INFORMATION - Continued

### FIRST-AID:

**IF INHALED**, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician, even if no symptoms are present. Keep under medical observation. Symptoms may be delayed.

**IN CASE OF FROSTBITE**, obtain immediate medical attention.

**DO NOT REMOVE THIS PRODUCT LABEL.**

**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.

**TARGET ORGANS:** Respiratory system, blood system, cardiovascular system, reproductive system.

### ADDITIONAL CANADIAN REGULATIONS:

**CANADIAN DSL INVENTORY:** The components of this product are listed on the DSL Inventory.

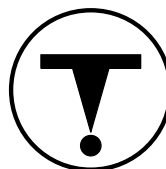
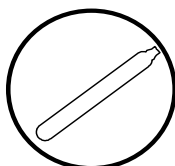
**OTHER CANADIAN REGULATIONS:** Not applicable.

**CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS:** The components of this product are not on the CEPA Priorities Substances Lists.

### CANADIAN WHMIS SYMBOLS:

**Class A:** Compressed Gases

**Class D2/AB:** Other Toxic Effects



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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. SPECIALTY AIR TECHNOLOGIES, Inc. 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, SPECIALTY AIR TECHNOLOGIES, Inc. 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.

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## 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. 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 over-exposure can result in permanent injury and may be fatal); **4** (extreme acute exposure hazard; onetime over-exposure 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 **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<sub>50</sub>** - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; **LC<sub>50</sub>** - 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<sup>3</sup>** 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. Other acronyms used are: **Superfund Amendments and Reauthorization Act (SARA)**; the **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 material's package label.