CONCENTRATION OF routine circumstances of use. A potential, significant health hazards associated with this gas mixture is the potential for overexposure to Carbon Dioxide. Carbon 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%) has no known permanent harmful effects.

**CARBON DIOXIDE** mixture is released in a small, poorly ventilated area (i.e. an enclosed or confined space), symptoms which may develop include the following:

- **5-10%**: Characteristic sharp odor noticeable. Very labored breathing, headache, mental confusion, increased blood pressure and respiratory rate. Judgment may be impaired; followed by loss of consciousness.
- **10%**: Unconsciousness occurs more rapidly above 10% level. Prolonged exposure to high concentrations may eventually result in death from asphyxiation.

Potential hazard associated with releases of this gas mixture is overexposure to Carbon Dioxide or Carbon Monoxide, components of this gas mixture. Inhalation of this gas mixture can cause nausea, dizziness, headache, mental confusion, increased blood pressure and respiratory rate, collapse, and death. Carbon Monoxide (especially in small confined spaces or other poorly-ventilated environments); individuals in such atmospheres may be asphyxiated.

**SYMPTOMS OF EXPOSURE**

**INHALATION**: Due to the small size of an individual cylinder of this gas mixture, no unusual health effects from overexposure to the product are anticipated under routine circumstances of use. A potential, significant health hazards associated with this gas mixture is the potential for overexposure to Carbon Dioxide. 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%) has no known permanent harmful effects.

**CONCENTRATION OF CARBON DIOXIDE**

**SYMPTOMS OF EXPOSURE**

1%: Slight increase in breathing rate.
2%: Breathing rate increases to 50% above normal; headache; tiredness.
3%: Breathing increases to twice normal rate, becoming labored; weak narcotic effect; impaired hearing; headache; increase in blood pressure and pulse rate.
4-5%: Breathing increases to 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. Prolonged exposure to high concentrations may eventually result in death from asphyxiation.

It is also important to note that Inhalation overexposures to atmospheres containing more than the Threshold Limit Value of Carbon Monoxide (25 ppm), another component of this gas mixture, can result in serious health consequences. Carbon Monoxide is classified as a chemical asphyxiant, producing a toxic action by combining with the hemoglobin of the blood and replacing the available oxygen. Through this replacement, the body is deprived of the oxygen required for respiration, and asphyxiation occurs.

Since the affinity of carbon monoxide for hemoglobin is about 200-300 times that of oxygen, only a small amount of Carbon Monoxide will cause a toxic reaction to occur. Carbon Monoxide exposures in excess of 50 ppm will produce symptoms of poisoning if breathed for a sufficiently long time. If this gas mixture is released in a small, poorly ventilated area (i.e. an enclosed or confined space), symptoms which may develop include the following:

**SYMPTOMS OF OVEREXPOSURE BY ROUTE OF EXPOSURE**: The most significant route of overexposure for this gas mixture is by inhalation. Inhalation: Due to the small size of an individual cylinder of this gas mixture, no unusual health effects from overexposure to the product are anticipated under routine circumstances of use. A potential, significant health hazards associated with this gas mixture is the potential for overexposure to Carbon Dioxide. 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%) has no known permanent harmful effects.
3. HAZARD IDENTIFICATION (Continued)

CONCENTRATION OF CARBON MONOXIDE

All exposure levels:
Overexposure to Carbon Monoxide can be indicated by the lips and fingertips turning bright 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.

200-2500 ppm:
Within 2 hours, there is mental confusion, headaches, and nausea. Unconsciousness within 30 minutes.

> 2500 ppm:
Potential for collapse and death before warning symptoms are produced.

Additionally, releases of this gas mixture may produce oxygen-deficient atmospheres (especially in small confined spaces or other poorly-ventilated environments); individuals in such atmospheres may be asphyxiated. Depending on the specific gas mixture, the health effects of Carbon Dioxide or Carbon Monoxide may develop before asphyxiation occurs.

OTHER POTENTIAL HEALTH EFFECTS:
Moisture in the air could lead to the formation of carbonic acid, which can be irritating to the eyes. Contact with the eyes can cause damage to the retinal ganglion cells.

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

ACUTE: Due to the small size of the individual cylinder of this gas mixture, no unusual health effects from exposure to the product are anticipated under routine circumstances of use. Depending on the concentration and duration of exposure, inhalation of this gas mixture may cause nausea, dizziness, visual disturbances, shaking, headache, mental confusion, sweating, reddening of the lips and fingernails, increased heartbeat, and elevated blood pressure and respiratory rate. Severe inhalation overexposures may be fatal, due to the effects of Carbon Dioxide, Carbon Monoxide, or asphyxiation. High concentrations of the gas mixture may cause eye irritation.

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. Carbon Monoxide is a potential reproductive toxin. Refer to Section 11 (Toxicological Information) of this MSDS for further information.

TARGET ORGANS: ACUTE: Respiratory system, blood system, cardiovascular system, eyes. CHRONIC: reproductive system, eyes.

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS GAS MIXTURE WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn.

No unusual health effects are anticipated after exposure to this gas mixture, due to the small cylinder size. If any adverse symptom develops after overexposure to this gas mixture, remove victim(s) to fresh air as quickly as possible. Only trained personnel should be exposed to as little as 2% of fresh air as much as possible. If necessary, monitor the surrounding area (and the original area of the release) for oxygen, Carbon Dioxide, and Carbon Monoxide. Carbon Monoxide may develop before asphyxiation occurs.

MEDICAL CONDITIONS AGRAGGATED BY EXPOSURE:
Pre-existing respiratory conditions and other disorders involving the “Target Organs” (See Section 3, Hazard Identification) may be aggravated by overexposure to this gas mixture. Carbon Monoxide, a component of this gas mixture, can aggravate some pre-existing conditions of the cardiovascular system, such as coronary artery disease and angina pectoris.

RECOMMENDATIONS TO PHYSICIANS:
Treat symptoms and eliminate overexposure. If necessary, treat for Carbon Monoxide poisoning. Hyperbaric oxygen is the most efficient antidote to Carbon Monoxide poisoning, the optimum range being 2-2.5 atm. A special mask, or, preferably, a compression chamber to utilize oxygen at these pressures is required. Avoid administering stimulant drugs.

5. FIRE-FIGHTING MEASURES

FLASH POINT:
Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

AUTOMATIC IGNITIBILITY:
Not applicable.

FLAMMABILITY LIMITS (in air by volume, %):
Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

EXTINGUISHING MATERIALS:
Non-flammable gas mixture. Use extinguishing media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
This gas mixture is not flammable; however, containers, involved in fire, may rupture or burst in the heat of the fire.

For emergency disposal and slowly discharge the gas to the atmosphere in a well-ventilated area or outdoors. Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for oxygen, Carbon Dioxide, and Carbon Monoxide. Carbon Dioxide and Carbon Monoxide level must be below exposure level listed in Section 2 (Composition and Information on Ingredients) before non-emergency personnel are allowed to re-enter area.

6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE:
Due to the small size and content of the cylinder, an accidental release of this gas mixture presents significantly less risk of an oxygen-deficient environment and other safety hazards than a similar release from a larger cylinder. However, as with any chemical release, extreme caution must be used during emergency response procedures. In the event of a release in which the atmosphere is unknown, and in which other chemicals are potentially involved, evacuate immediate area. Such releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area and protect people.

For emergency disposal and slowly discharge the gas to the atmosphere in a well-ventilated area or outdoors. Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for oxygen, Carbon Dioxide, and Carbon Monoxide. Carbon Dioxide and Carbon Monoxide level must be below exposure level listed in Section 2 (Composition and Information on Ingredients) before non-emergency personnel are allowed to re-enter area.

If leaking incidentally from the cylinder or its valve, contact your supplier.

7. HANDLING AND USE

WORK PRACTICES AND HYGIENE PRACTICES:
Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of this gas mixture could occur without any significant warning symptoms, due to oxygen deficiency. Do not attempt to repair, adjust, or in any other way modify the cylinders containing this gas mixture. If there is a malfunction or another type of operational problem, contact nearest distributor immediately.

STORAGE AND HANDLING PRACTICES:
Cylinders should be firmly secured to prevent falling or being knocked-over. Cylinders must be protected from the environment, and preferably kept at room temperature (approximately 21°C (70°F)). Cylinders should be stored in dry, well-ventilated areas, away from sources of heat, ignition, and direct sunlight. Protect cylinders against physical damage.

Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. These cylinders are not refillable. WARNING! Do not refill DOT 39 cylinders. To do so may cause personal injury or property damage.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS:
Compressed gases can present significant safety hazards. During cylinder use, use equipment designed for specified specific cylinders. Ensure all lines and equipment are rated for proper service pressure.

PROTECTIVE PRACTICES AND CONTAMINATED EQUIPMENT:
Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS:
No special ventilation systems or engineering controls are needed under normal circumstances of use. As with all chemicals, use this gas mixture in well-ventilated areas. If this gas mixture is used in a poorly-ventilated area, install automatic monitoring equipment to detect the levels of Carbon Dioxide, Carbon Monoxide and oxygen.

Hazardous Material Identification System:
- Health Hazard: 0
- Flammability Hazard: 0
- Physical Hazard: 0
- Protective Equipment: 0
- Respiratory Protection: 0
- Eye Protection: 0
- Gloves: 0
- Body Protection: 0

See Section 8 for restricted industrial use and handling applications.
8. EXPOSURE CONTROLS - PERSONAL PROTECTION (continued)

RESPIRATORY PROTECTION: No special respiratory protection is required under normal circumstances of use. Use supplied air respiratory protection if Carbon Dioxide or Carbon Monoxide level exceeds limits given in Section 2 (Composition Information on Ingredients) and oxygen levels are below 19.5% or unknown during emergency response to a release of this gas mixture. 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 Canadian CSA Standard Z94.4-2009 and applicable standards of Canadian Provinces. Oxygen levels below 19.5% are considered IDLH by OSHA. In such atmospheres, use of a full-facepiece pressure-demand SCBA or a full-facepiece, supplied air respirator with auxiliary self-contained air supply is required under OSHA’s Respiratory Protection Standard (1910.134-1998).

Respiratory protection guidelines for MSOH for Carbon Dioxide are provided below for information.

CARBON DIOXIDE

CONCENTRATION: Up to 40,000 ppm:
Any Supplied-Air Respirator (SAR), or any Self-Contained Breathing Apparatus (SCBA) with a full facepiece.
Emergency or Planned Entry into Unknown Concentrations or IDLH Conditions: Any SCBA that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary SCBA operated in pressure-demand or other positive-pressure mode.
Escape: Any appropriate escape-type, SCBA.

EYE PROTECTION: Safety glasses, if necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Use gloves when handling cylinders. Chemically-resistant gloves should be worn when using this gas mixture. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: No special protection is needed under normal circumstances of use. If a hazard of injury to the feet exists due to falling objects, rolling objects, where objects may pierce the soles of the feet or where employee’s feet may be exposed to electrical hazards, use foot protection, as described in U.S. OSHA 29 CFR 1910.136.

9. PHYSICAL and CHEMICAL PROPERTIES

Unless otherwise specified, the following information is for Carbon Dioxide, a main component of this gas mixture.

GAS DENSITY @ 21.1°C (70°F) and 1 atm: 0.0144 lb/ft³ (1.833 kg/m³)
LIQUID DENSITY @ 21.1°C (70°F) and 838 psig (5778 kPa): 47.35 lb/ft³ (761.3 kg/m³)
FREEZING/MELTING POINT: (sublimation temperature) -78.5°C (-109.3°F)
TRIPLE POINT: -55.6°C (49.9°F) @ 0.04 atm (416 kPa)
SPECIFIC GRAVITY (air = 1) @ 70.1°C (211°F): 1.522
ODOR THRESHOLD: Not available.
EVAPORATION RATE (nBuAc = 1): Not applicable.
VAPOR PRESSURE @ 21.1°C (70°F) psig: 838 psig (5778 kPa)
COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

Unless otherwise specified, the following information is for Helium, a main component of this gas mixture.

TCLo (Inhalation-Rabbit) 13 pph/4 hours:
TCLo (Inhalation-Rat) 6 pph/24 hours: female
TCLo (Inhalation-Mouse) 55 pph/4 hours: male
TCLo (Inhalation-Man) 600 mg/m³/10 minutes: Behavioral: headache
TCLo (Inhalation-Man) 600 mg/m³/10 minutes: Behavioral: headache
TCLo (Inhalation-Rabbit) 1830 mg/m³/1 hour14 days-intermittent: Cardio: other changes
TCLo (Inhalation-Rat) 13 pph/4 hours: female
TCLo (Inhalation-Man) 55 pph/4 hours: male
TCLo (Inhalation-Mouse) 55 pph/4 hours: male
TCLo (Inhalation-Rat) 6 pph/24 hours: female
TCLo (Inhalation-Rabbit) 13 pph/4 hours: female
TCLo (Inhalation-Rat) 6 pph/24 hours: female
TCLo (Inhalation-Man) 600 mg/m³/10 minutes: Behavioral: headache
TCLo (Inhalation-Man) 600 mg/m³/10 minutes: Behavioral: headache
TCLo (Inhalation-Rabbit) 1830 mg/m³/1 hour 14 days-intermittent: Cardio: other changes

10. STABILITY and REACTIVITY

STABILITY: Normally stable in gaseous state.

DECOMPOSITION PRODUCTS: The thermal decomposition products of Methane include carbon oxides. The other components of this gas mixture do not decompose in either compound can read with other compounds in the heart of a fire.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Titanium will burn in Nitrogen (the main component of this gas mixture). Lithium reacts with chlorine, bromine pentafluoride, oxygen, oxygen difluoride, and nitrogen trifluoride. Due to the presence of Carbon Dioxide, this gas mixture may be incompatible with a variety of metals, alloys, and metal acetylides (e.g., aluminum, chromium, and zirconium). Carbon Dioxide will react with alkaline material, sperm morphology, motility, and count.

11. TOXICOLOGICAL INFORMATION

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

CARBON DIOXIDE

LC50 (Inhalation-Human) 9 ppm/4 hours
LC50 (Inhalation-Mammal-specified) 9000 ppm/5 minutes
LC50 (Inhalation-Man) 10000 ppm/24 hours/day, continuous: Blood: other changes
LC50 (Inhalation-Rat) 6 ppm/24 hours: female 10 day(s) after conception: Reproductive: Specific Developmental Abnormalities: musculoskeletal system, respiratory system
LC50 (Inhalation-Rat) 27700 ppm/24 hours/day, continuous: Blood: other changes
LC50 (Inhalation-Rat) 6 ppm/24 hours: female 10 day(s) after conception: Reproductive: Specific Developmental Abnormalities: musculoskeletal system
LC50 (Inhalation-Mouse) 55 ppm/2 hours: male 3 day(s) post-mating: Reproductive: Paternal: sperm-morphology, motility, and count
LC50 (Inhalation-Mouse) 55 ppm/4 hours: male 6 day(s) post-mating: Reproductive: Fertility: male fertility index (e.g. # males impregnating females per # males exposed to fertile non-pregnant females)
LC50 (Inhalation-Mouse) 2 ppm/8 hours: male 10 day(s) after conception: Reproductive: Fertility: pre-implantation mortality (e.g. dead and/or resorbed implants per total number of implants): Specific Developmental Abnormalities
LC50 (Inhalation-Rat) 1800 ppm/4 hours
LC50 (Inhalation-Rabbit) 2444 ppm/4 hours
LC50 (Inhalation-Guinea Pig) 5715 ppm/4 hours
LC50 (Inhalation-inhaled bird species) 1334 ppm/4 hours
LC50 (Inhalation-Human) 4 mg/m³/12 hours: Behavioral: coma; Vascular: BP lowering not characterized in autonomic section

Blood: methemoglobinemia; carbonylhemoglobin.
LC50 (Inhalation-Human) 4000 ppm/30 minutes
LC50 (Inhalation-Human) 5000 ppm/5 minutes
LC50 (Inhalation-Rat) 4000 ppm/46 minutes
LC50 (Inhalation-Rabbit) 4000 ppm
LC50 (Inhalation-Mammal-species unspecified) 4000 ppm/46 minutes

TCLo (Inhalation-Man) 600 mg/m³/10 minutes: Behavioral: headache
TCLo (Inhalation-Man) 650 mg/m³/45 minutes: methemoglobinemia; carbonylhemoglobin; Behavioral: changes in psychophysiological tests
TCLo (Inhalation-Rat) 1830 mg/m³/1 hour14 days-intermittent: Cardio: other changes

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11. TOXICOLOGICAL INFORMATION (continued)

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

CARBON MONOXIDE (continued):
TCO (Inhalation-Rat) 30 ppm/18 hours/10 weeks-continuous: Blood: hyperglycemia
TCO (Inhalation-Rat) 90 ppm/24 hours/10 weeks-continuous: Blood: hyperglycemia
TCO (Inhalation-Rat) 300 ppm/24 hours/2 days-intermittent: Blood: nucleated red blood cells, changes in other cell counts; changes in erythrocyte (RBC) count
TCO (Subcutaneous-Rat) 5983 mg/kg/18 weeks-continuous: Blood: changes in serum composition (e.g. TP, bilirubin, cholesterol).
TCO (Inhalation-Mouse) 50 ppm/30 days-intermittent: Lunga, Thorax, or Respiration: structural or functional change in trachea
TCO (Inhalation-Monkey) 200 ppm/24 hours/90 days-continuous: Blood: pigmented or nucleated red blood cells, other changes
TCO (Inhalation-Rabbit) 200 mg/m3/13 weeks-intermittent: Brain and Coverings: test animals exposed to high concentrations of Carbon Dioxide indicate teratogenic effects (e.g., cardiac and skeletal malformations, stillbirths).
TCO (Inhalation-Guinea Pig) 200 mg/m3/4 weeks/4 weeks-intermittent: Endocrine: hypergycemia
TCO (Inhalation-Guinea Pig) 200 mg/m3/30 weeks-continuous: Cardio: cardiovascular (including an increase in heart rate and cardiac conduction), EKG changes not diagnostic of specific effects, pulse rate increases, weight loss
TCO (Inhalation-Guinea Pig) 200 ppm/24 hours/30 days-intermittent: Blood: pigmented or nucleated red blood cells, other changes
\[\text{\ldots}\]

CARBON MONOXIDE: For further information, refer to Section 16 (Other Information).

NITROGEN:

Activity of Chemical on Aquatic Life

The following toxicology data are available for the components of this gas mixture: Table: Microscopic Test (Inhalation-Mouse)1500 ppm/10 minutes

HUMAN

There are no specific toxicology data for Helium. Helium is a simple asphyxiant.

METHANE: There are no specific toxicology data for Methane. Methane is a simple asphyxiant.

NITROGEN: There are no specific toxicology data for Nitrogen. Nitrogen is a simple asphyxiant.

CARBON DIOXIDE: Due to the formation of carbonic acid, this gas mixture can be slightly irritating to contaminated eyes.

SENSITIVITY OF PRODUCT: The components of this gas mixture are not skin or respiratory sensitizers.

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

Mutagenicity: The components of this gas mixture are not reported to cause mutagenic effects in humans.

Embryotoxicity: The components of this gas mixture are not reported to cause embryotoxic effects in humans.

Teratogenicity: This gas mixture is not expected to cause teratogenic effects in humans due to the small cylinder size and small total amount of all components. The Carbon Monoxide component of this gas mixture in up to 1% can cause teratogenic effects in humans. Severe exposure to Carbon Monoxide during pregnancy can have adverse effects on the fetus and the death of the fetus. In general, maternal symptoms are an indicator of the potential risk to the fetus since Carbon Monoxide is toxic to the mother before it is toxic to the fetus. Additionally, clinical studies involving teratogenic effects exposed to high concentrations of Carbon Dioxide indicate teratogenic effects (e.g., cardiac and skeletal malformations, stillbirths).

Reproductive Toxicity: The components of this gas mixture are not reported to cause adverse reproductive effects in humans.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generations. An abortogen is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the effect does not propagate across generational lines. A reproductive toxin 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.

BIOLOGICAL EXPOSURE INDICES (BEIs): Biological Exposure Indices (BEIs) have been determined for the components of this gas mixture, as follows:

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 gas mixture.

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

CARBON MONOXIDE: Water solubility = 3.3 ml/100 ml at 0°C, 2.3 ml at 20°C

OXYGEN: Water Solubility = 1 volume Oxygen/32 volumes water at 20°C. Log Kow = 0.65

NITROGEN: 0.24 volume Oxygen/100 volumes water at 0°C, 0.16 volumes Oxygen/100 volumes water at 20°C

EFFECT OF MATERIAL ON PLANTS OR ANIMALS: The Carbon Monoxide component of this gas mixture can be deadly to exposed animal life, producing symptoms similar to those experienced by humans. Carbon Monoxide may also be harmful to plant life. The following information is available on the components of this gas mixture:

CARBON DIOXIDE: Waterfowl toxicity: Inhaled 0.5%, no effect

EFFECT OF CHEMICAL ON AQUATIC LIFE: There is no evidence currently available on this gas mixture’s effects on aquatic life. The presence of more than a trace of the Carbon Monoxide component of this gas mixture is a hazard to fish. Additional aquatic toxicity data are available on this gas mixture’s components, as follows:

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate U.S. Federal, State, and local regulations, or the applicable standards of Canada and its Provinces. Cylinders with undesired residual product may be safely vented outdoors with the proper regulator. For further information, refer to Section 15 (Other Information).

14. TRANSPORTATION INFORMATION

THIS GAS MIXTURE IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION. PREPARED SHIPMENT NUMBER: Compressed gases, n.o.s. ("Oxygen, Nitrogen") for the gas component with the highest next concentration to Nitrogen.

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1055

PACKING GROUP: Not applicable.

DOT LABEL(S) REQUIRED: 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).
14. TRANSPORTATION INFORMATION (continued)

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

Note: DOT 39 Cylinders ship in a strong outer carton (outside package). Pertinent shipping information goes on the outside of the outer package. DOT 39 Cylinders do not have transportation information on the cylinder itself.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This gas is considered as Dangerous Goods, per regulations of Transport Canada of Canada.

PROPER SHIPPING NAME: Compressed gases, n.o.s. (*Oxygen, Nitrogen*) or the gas component with the next highest concentration next to Nitrogen.

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)

UN IDENTIFICATION NUMBER: UN 1956

PACKING GROUP: Not Applicable

HAZARD LABEL: Class 2.2 (Non-Flammable Gas)

SPECIAL PROVISIONS: None

EXPLOSIVE LIMIT AND LIMITED QUANTITY INDEX: 0.12

ERAD-AL - VOLUME: None

PASSENGER CARRYING SHIP INDEX: None

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

- California - Permissible Exposure Limits for Carbon Dioxide, Oxygen, Nitrogen, Methane, Helium.
- Missouri - Employer Information/Toxic Substances: No.
- New Jersey - Right to Know Hazardous Substance List: Carbon Dioxide, Oxygen, Helium, Nitrogen, Methane.
- North Dakota - Li st of Hazardous Chemicals, Reportable Quantities: No.
- Ohio - Hazardous Substance List: Carbon Dioxide, Oxygen, Helium, Nitrogen, Methane.
- Rhode Island - Hazardous Substance List: Carbon Dioxide, Oxygen, Helium, Nitrogen, Methane.
- Texas - Hazardous Substance List: No.
- Wisconsin - Toxic and Hazardous Substances: Carbon Dioxide.

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): The Carbon Monoxide component of this gas mixture is on the California Proposition 65 list as a chemical known to the State of California to cause birth defects or other reproductive harm. **WARNING:** This gas mixture contains a chemical that is known to the State of California to cause birth defects or other reproductive harm.

ADDITIONAL CANADIAN REGULATIONS:
- CANADIAN DSL/NDSL INVENTORY STATUS: The components of this gas mixture are on the Canadian DSL Inventory.
- OTHER REGULATORY INFORMATION: Not applicable.
- CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LIST: The components of this gas mixture are not on the CEPA Priorities Substances Lists.
- CANADIAN WHIMS CLASIFICATION: This gas mixture is categorized as a Controlled Product, Hazard Classes A and D2A, as per the Controlled Product Regulations.

15. REGULATORY INFORMATION

INFORMATION ABOUT DOT-39 NRC (Non-Refillable Cylinder) PRODUCTS

DOT 39 cylinders ship as hazardous materials when full. Once the cylinders are relieved of pressure (empty) they are not considered hazardous material or waste. Residual gas in this type of cylinder is not an issue because toxic gas mixtures are prohibited. Calibration gas mixtures typically packaged in these cylinders are Nonflammable n.o.s., UN 1956. A small percentage of calibration gases packaged in DOT 39 cylinders are flammable or oxidizing gas mixtures.

For disposal of used DOT-39 cylinders, it is acceptable to place them in a landfill if local laws permit. Their disposal is no different than that employed for disposal of used DOT-39 cylinders. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day).

When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Correctly labeled and stored cylinders will help ensure safety.

Further information about the handling of compressed gas cylinders can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102. Telephone: (703) 412-0900.

- P-1 "Safe Handling of Compressed Gases in Containers"
- P-4 "Bottling and Storing of Compressed Gases"
- P-9 "Handling of Compressed Gases"

This Material Safety Data Sheet is offered pursuant to OSHA’s Hazard Communication Standard, 29 CFR, 1910.1200. Other government regulations must be reviewed for applicability to this gas mixture. To the best of our knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness are not guaranteed and no warranties of any type, either express or implied, are provided. The information contained herein relates only to this specific product. If this gas mixture is combined with other materials, all component properties must be considered. Data may be changed from time to time. Be sure to consult the latest edition.