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: CARBON DIOXIDE: 0.5-99%; HELIUM: 1-99% ARGON: Balance

TRADE NAMES/SYNONYMS: GOLD GAS™ SHIELDING GASES: StainMIX 3; UltiMIX; HB Tri-Mix; A-1025

DOCUMENT NUMBER: 002010

PRODUCT USE: For General Analytical/Synthetic Chemical Uses

SUPPLIER/MANUFACTURER’S NAME: AIRGAS INC.

ADDRESS: 259 North Radnor-Chester Road
Suite 100
Radnor, PA 19087-5283

BUSINESS PHONE: 1-610-687-5253

EMERGENCY PHONE: 1-800-949-7937

International: 1-423-479-0293

DATE OF PREPARATION: October 7, 1996

DATE OF REVISION: June 16, 2003

2. COMPOSITION and INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>CHEMICAL NAME</th>
<th>CAS #</th>
<th>mole %</th>
<th>EXPOSURE LIMITS IN AIR</th>
</tr>
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<tbody>
<tr>
<td></td>
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<td></td>
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<td>TWA</td>
</tr>
<tr>
<td>Helium</td>
<td>7440-59-7</td>
<td>1.0-99.0%</td>
<td>There are no specific exposure limits for Helium. Helium is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.</td>
</tr>
<tr>
<td>Carbon Dioxide</td>
<td>124-38-9</td>
<td>0.5-99.0%</td>
<td>5000</td>
</tr>
<tr>
<td>Argon</td>
<td>7440-37-1</td>
<td>Balance</td>
<td>There are no specific exposure limits for Argon. Argon is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.</td>
</tr>
</tbody>
</table>

NE = Not Established.  NIC = Notice of Intended Change  See Section 16 for Definitions of Terms Used.

NOTE (1): ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-1998 format. This gas mixture has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.
3. HAZARD IDENTIFICATION

**EMERGENCY OVERVIEW:** This gas mixture 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:

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

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 the gas can quickly subside. Moisture in the air could lead to the formation of carbonic acid (from the Carbon Dioxide gas present in this gas mixture), 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.

**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. Chronic exposure to oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system. Refer to Section 11 (Toxicological Information) of this MSDS for further information.
3. HAZARD IDENTIFICATION (Continued)

TARGET ORGANS: ACUTE: Respiratory system, cardiovascular system, eyes. CHRONIC: Blood system, circulatory system, central nervous system, cardiac system.

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

4. FIRST-AID MEASURES

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

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). 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.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Disorders involving the “Target Organs” (see Section 3, Hazard Information) may be aggravated by overexposure to this gas mixture.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and eliminate overexposure.

5. FIRE-FIGHTING MEASURES

FLASH POINT: Not applicable.
AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):

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<tr>
<th></th>
<th>Lower (LEL)</th>
<th>Upper (UEL)</th>
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<tbody>
<tr>
<td></td>
<td>Not applicable.</td>
<td>Not applicable.</td>
</tr>
</tbody>
</table>

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 Static Discharge: Not sensitive.

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 preplanned 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 gas mixture 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 gas mixture could occur without any significant warning symptoms.
7. HANDLING and STORAGE (Continued)

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). Isolate from incompatible materials (see Section 10, Stability and Reactivity for more information). 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 pressure relief devices. 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 (if provided), 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 gas mixture from the cylinder. Use check valve or trap in discharge line to prevent hazardous backflow into the cylinder. Do not use oils or grease on gas-handling fittings or equipment.

After Use: Close main cylinder valve. Replace valve protection cap (if provided). Mark empty cylinders “EMPTY”.

NOTE: Use only DOT or ASME code containers. 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. Also see CGA P-9, the Inert Gases, Argon, Nitrogen, and Helium; CGA Safety 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 gas mixture in areas where adequate ventilation is provided.

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.

RESPIRATORY PROTECTION: Maintain oxygen levels above 19.5% in the workplace. 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 Z94.4-93 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). The following are NIOSH respiratory protection guidelines for the Carbon Dioxide component.

CARBON DIOXIDE CONCENTRATION: 0-40,000 ppm.

RESPIRATORY PROTECTION:
- 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, or any SAR 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: Splash goggles, face-shields or safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133, or Canadian Standards.

HAND PROTECTION: Wear mechanically-resistant gloves when handling cylinders of this gas mixture. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate for task. 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.
9. PHYSICAL and CHEMICAL PROPERTIES

The following information is available for Argon, a possible main component of this product, unless otherwise stated:

- **VAPOR DENSITY**: 1.650 kg/m³
- **SPECIFIC GRAVITY (air = 1)**: 1.380
- **SOLUBILITY IN WATER**: 3.37% (v/v @ 20°C)
- **VAPOR PRESSURE**: Not applicable.
- **EXPANSION RATIO**: Not applicable.
- **COEFFICIENT WATER/OIL DISTRIBUTION**: Not applicable.
- **SPECIFIC VOLUME (ft³/lb)**: 9.7

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

- **SPECIFIC GRAVITY (gas) @ 21°C (70°F)**: 1.52
- **SOLUBILITY IN WATER**: Insoluble.
- **SPECIFIC VOLUME (ft³/lb)**: 8.8
- **TRIPLE POINT @ 60.4 psig (416 kPa)**: -56.6°C (-69.9°F)
- **pH @ 1 atm**: 3.7 (carbonic acid)
- **GAS DENSITY @ 21°C (70°F), 1 atm**: 0.1144 lb/ft³ (1.833 kg/m³)
- **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 possible main component of this gas mixture.

- **VAPOR DENSITY @ 0°C**: 0.178 kg/m³
- **SPECIFIC GRAVITY (air = 1)**: 0.1381
- **SOLUBLE IN WATER**: Insoluble.
- **EVAPORATION RATE (nBuAc = 1)**: Not applicable.
- **ODOR THRESHOLD**: Not applicable.
- **SPECIFIC VOLUME (ft³/lb)**: 96.7

The following is applicable to the gas mixture:

- **APPEARANCE AND COLOR**: This product is a colorless, odorless gas.
- **HOW TO DETECT THIS SUBSTANCE**: In terms of leak detection, fittings and joints can be painted with a soap solution to detect leaks, which will be indicated by a bubble formation.

10. STABILITY and REACTIVITY

- **STABILITY**: Normally stable gas.
- **DECOMPOSITION PRODUCTS**: The Carbon Dioxide component of this gas mixture 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**: The Carbon Dioxide component of this gas mixture 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 gas mixture 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 gas mixture to incompatible chemicals.

PART IV

Is there any other useful information about this material?

11. TOXICOLOGICAL INFORMATION

- **TOXICITY DATA**: The Helium and Argon components are inert. The following data are for the Carbon Dioxide component of this gas mixture.

   **CARBON DIOXIDE**:
   - **LCLo (Inhalation-Human)**: 9 pph/5 minutes
   - **LCLo (Inhalation-Mammal-species unspecified)**: 9000 ppm/5 minutes
   - **TCLo (Inhalation-Rat)**: 10000 ppm/24 hours/days-continuous: Blood: other changes
   - **TCLo (Inhalation-Rat) 6 ppm/24 hours**: female 10 day(s) after conception: Reproductive: Specific Developmental Abnormalities: musculoskeletal system, cardiovascular (circulatory) system, respiratory system
   - **TCLo (Inhalation-Rat) 6 ppm/24 hours**: female 10 day(s) after conception: Reproductive: Effects on Newborn: growth statistics (e.g., reduced weight gain).
   - **TCLo (Inhalation-Rabbit)**: 27,000 ppm/24 hours/30 days-continuous: Behavioral: somnolence (general depressed activity)
   - **TCLo (Inhalation-Rabbit) 13 ppm/4 hours**: female 9-12 day(s) after conception: Reproductive: Specific Developmental Abnormalities: musculoskeletal system
   - **TCLo (Inhalation-Mouse)**: 55 ppm/24 hours: male 3 day(s) pre-mating: Reproductive: Paternal Effects: spermatogenesis (incl. genetic material, sperm morphology, motility, and count)

   **CARBON DIOXIDE (continued)**:
   - **TCLo (Inhalation-Mouse)**: 55 ppm/4 hours: male 6 day(s) pre-mating: Reproductive: Fertility: male fertility index (e.g. # males impregnating females per # males exposed to fertile non-pregnant females)
   - **TCLo (Inhalation-Mouse)**: 2 ppm/8 hours: female 10 day(s) after conception: Reproductive: Fertility: post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants); Specific Developmental Abnormalities: musculoskeletal system
11. TOXICOLOGICAL INFORMATION (Continued)

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.

IRRITANTITY 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 skin or respiratory sensitizers.

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

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

**BIOLICAL EXPOSURE INDICES**: Currently there are no Biological Exposure Indices (BEIs) determined for the components of this gas mixture.

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**:
The extensive sets of global CO2 measurements of the National Oceanic and Atmospheric Admin (NOAA) Geophysical Monitoring for Climatic Change (GMCC) division and of the Upper Atmosphere and Space Research Laboratory of Tohoku University are combined with a two-dimensional transport model to derive, in an "inverse" calculation, the latitudinal and seasonal distributions of sources and sinks of CO2, necessary to reproduce the observed concentration. It is found that the southern oceans are a sink of carbon of 0.8 to 1.5 Gt/yr (1 Gt = 1 x 10+15 g) and that the equatorial areas are a source to the atmosphere of 1.4 to 2.8 Gt. There seems to be significant seasonality in the sources and sinks of CO2, both in the tropics and in the southern oceans. Seasonal net ecosystem production north of 25 deg N is found to be 6.2 to 8.2 Gt of carbon. The global average net source of atmospheric CO2 estimated from the Tohoku data is 2.84 Gt C/yr, while for the GMCC data it is 2.96 Gt C/yr/year.

**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**: No evidence is currently available on this product’s effects on aquatic life. The following aquatic toxicity data are available for the components of this gas mixture.

**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**: Product removed from cylinder must be disposed of 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 Airgas, Inc. Do not dispose of locally.

14. TRANSPORTATION INFORMATION

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

**PROPER SHIPPING NAME**: Compressed gas, n.o.s. (Carbon Dioxide, Argon) or (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 Marine Pollutants (as defined by 49 CFR 172.101, Appendix B).
TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This gas mixture is considered as Dangerous Goods, per regulations of Transport Canada. The use of the above U.S. DOT information from the U.S. 49 CFR regulations is allowed for shipments that originate in the U.S. For shipments via ground vehicle or rail that originate in Canada, the following information is applicable.

PROPER SHIPPING NAME: Compressed gas, n.o.s. (Carbon Dioxide, Argon) or (Carbon Dioxide, Helium)

HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Compressed Gas)

UN IDENTIFICATION NUMBER: UN 1956

PACKING GROUP: Not Applicable

HAZARD LABEL(S) REQUIRED: Class 2.2 (Compressed Gas)

SPECIAL PROVISIONS: None

EXPLOSIVE LIMIT & LIMITED QUANTITY INDEX: 0.12

ERAP INDEX: None

PASSENGER CARRYING SHIP INDEX: None

PASSENGER CARRYING ROAD OR RAIL VEHICLE INDEX: 75

MARINE POLLUTANT: Not applicable.

15. REGULATORY INFORMATION

ADDITIONAL U.S. REGULATIONS:

U.S. SARA REPORTING REQUIREMENTS: No component of this gas mixture is 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: There are no specific Threshold Planning Quantities for this material. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. TSCA INVENTORY STATUS: The components of this product are listed on the TSCA Inventory.

U.S. CERCLA REPORTABLE QUANTITIES (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: 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.


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.

CGA LABELING (For Compressed Gas):

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.

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 GAS MIXTURE LABEL.
15. REGULATORY INFORMATION (Continued)

ADDITIONAL CANADIAN REGULATIONS:
CANADIAN DSL/NDSL INVENTORY STATUS: Components of this gas mixture are listed on the DSL Inventory.
CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: Components of this gas mixture are not on the CEPA Priorities Substances Lists.

CANADIAN WHMIS SYMBOLS: Class A: Compressed Gases

PREPARED BY:
CHEMICAL SAFETY ASSOCIATES, Inc.
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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 that uniquely identifies each constituent.

EXPOSURE LIMITS IN AIR:
CEILING LEVEL: The concentration that shall not be exceeded during any part of the working exposure.
LOQ: Limit of Quantitation.
MAK: Federal Republic of Germany Maximum Concentration Values in the workplace.
NE: Not Established. When no exposure guidelines are established, an entry of NE is made for reference.
NIC: Notice of Intended Change.
NIOSH CEILING: The exposure that shall not be exceeded during any part of the workday. If instantaneous monitoring is not feasible, the ceiling shall be assumed as a 15-minute TWA exposure (unless otherwise specified) that shall not be exceeded at any time during a workday.

NIOSH RELs: NIOSH’s Recommended Exposure Limits.
PEL-Permissible Exposure Limit: OSHA’s Permissible Exposure Limits. 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 that was vacated by Court Order.

SKIN: Used when there is a danger of cutaneous absorption.

STEL-Short Term Exposure Limit: Short Term Exposure Limit, usually a 15-minute time-weighted average (TWA) exposure that should not be exceeded at any time during a workday, even if the 8-hr TWA is within the TLV-TWA, PEL-TWA or REL-TWA.

TWA-Threshold Limit Value: An airborne concentration of a substance that 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.

TWA-Time Weighted Average: Time Weighted Average exposure concentration for a conventional 8-hr (TLV, PEL) or up to a 10-hr (REL) workday and a 40-hr workweek.

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.

Hazardous Materials Identification System

HAZARD RATINGS: This rating system was developed by the National Paint and Coating Association and has been adopted by industry to identify the degree of chemical hazards.

HEALTH HAZARD:
0 (Minimal Hazard): No significant health risk, irritation of skin or eyes not anticipated. Skin Irritation: Essentially non-irritating. PII or Draize = “0”. Eye Irritation: Essentially non-irritating, or minimal effects which clear in < 24 hours [e.g. mechanical irritation]. Draize = “0”. Oral Toxicity LD₅₀ Rat or Rabbit: < 5000 mg/kg. Dermal Toxicity LD₅₀ Rat or Rabbit: < 2000 mg/kg. Inhalation Toxicity 4-hr LC₅₀ Rat or Rabbit: < 20 mg/L; 1 (Slight Hazard): Minor reversible injury may occur; slightly or mildly irritating. Skin Irritation: Slightly or mildly irritating. Eye Irritation: Slightly or mildly irritating. Oral Toxicity LD₅₀ Rat or Rabbit: > 500-5000 mg/kg. Dermal Toxicity LD₅₀ Rat or Rabbit: > 1000-2000 mg/kg. Inhalation Toxicity LC₅₀ 4-hrs Rat: > 2-20 mg/L; 2 (Moderate Hazard): Temporary or transitory injury may occur. Skin Irritation: Moderately irritating; primary irritant; sensitizer. PII or Draize > 0, < 5. Eye Irritation: Moderately to severely irritating and/or corrosive; reversible corneal opacity; corneal involvement or irritation clearing in 8-21 days. Draize > 0, < 25. Oral Toxicity LD₅₀ Rat or Rabbit: > 50-500 mg/kg. Dermal Toxicity LD₅₀ Rat or Rabbit: > 200-1000 mg/kg. Inhalation Toxicity LC₅₀ 4-hrs Rat or Rabbit: > 0.5-5 mg/L; 3 (Serious Hazard): Major injury likely unless prompt action is taken and medical treatment is given; high level of toxicity; corrosive. Skin Irritation: Severely irritating and/or corrosive; may destroy dermal tissue, cause skin burns, dermal necrosis. PII or Draize > 5-8 with destruction of tissue. Eye Irritation: Corrosive, irreversible destruction of ocular tissue; corneal involvement or irritation persisting for more than 21 days. Draize > 20 mg/L. Oral Toxicity LD₅₀ Rat or Rabbit: > 1-50 mg/kg. Dermal Toxicity LD₅₀ Rat or Rabbit: > 20-200 mg/kg. Inhalation Toxicity LC₅₀ 4-hrs Rat: > 0.05-0.5 mg/L.; 4 (Severe Hazard): Life-threatening; major or permanent damage may result from single or repeated exposure. Skin Irritation: Not appropriate. Do not rate as a “4”, based on skin irritation alone. Eye Irritation: Not appropriate. Do not rate as a “4”, based on eye irritation alone. Oral Toxicity LD₅₀ Rat: < 1 mg/kg. Dermal Toxicity LD₅₀ Rat or Rabbit: ≤ 20 mg/kg. Inhalation Toxicity LC₅₀ 4-hrs Rat: ≤ 0.05 mg/L;
HAZARDOUS MATERIALS IDENTIFICATION SYSTEM
HAZARD RATINGS (continued):

FLAMMABILITY HAZARD:
0 (Minimal Hazard-Materials that will not burn in air when exposure to a temperature of 815.5°C [1500°F] for a period of 5 minutes.; 1 (Slight Hazard-Materials that must be pre-heated before ignition can occur. Material require considerable pre-heating, under all ambient temperature conditions before ignition and combustion can occur, including: Materials that will burn in air when exposed to a temperature of 815.5°C (1500°F) for a period of 5 minutes or less; Liquids, solids and semisolids having a flash point at or above 93.3°C [200°F] [e.g. OSHA Class III B, or; Most ordinary combustible materials [e.g. wood, paper, etc.]; 2 (Moderate Hazard-Materials that must be moderately heated or exposed to relatively high ambient temperature before ignition can occur. Materials in this degree would not, under normal conditions, form hazardous atmospheres in air, but under high ambient temperatures or moderate heating may release vapor in sufficient quantities to produce hazardous atmospheres in air. Including: Liquids having a flash-point at or above 37.8°C [100°F]; Solid materials in the form of course dusts that may burn rapidly but that generally do not form explosive atmospheres. Solid materials in a fibrous or shredded form that may burn rapidly and create flash fire hazards (e.g. cotton, sisa, hemp; Solids and semisolids that readily give off flammable vapors.); 3 (Serious Hazard- Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures, or, unaffected by ambient temperature, are readily dispersed in air or form explosive mixtures with air and are readily dispersed in air [e.g., dusts of combustible solids, mists or droplets of flammable liquids]; Materials that burn extremely rapidly, usually by reason of self-contained oxygen [e.g. dry nitrocellulose and many organic peroxides]; 4 (Danger Hazard-Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and which will burn readily, including: Flammable gases; Flammable cryogenic materials; Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C [73°F] and having a boiling point at or above 38°C [100°F] and below 37.8°C [100°F] [e.g. OSHA Class IB and IC]; Materials that on account of their physical form or environmental conditions can form explosive mixtures with air and are readily dispersed in air [e.g., dusts of combustible solids, mists or droplets of flammable liquids]; Materials that burn extremely rapidly, usually by reason of self-contained oxygen [e.g. dry nitrocellulose and many organic peroxides]; 4 (Danger Hazard-Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air, and which will burn readily, including: Flammable gases; Flammable cryogenic materials; Any liquid or gaseous material that is liquid while under pressure and has a flash point below 22.8°C [73°F] and having a boiling point at or above 38°C [100°F] and below 37.8°C [100°F] [e.g. OSHA Class IA; Material that ignite spontaneously when exposed to air at a temperature of 54.4°C (130°F) or below [e.g. pyrophoric]).

PHYSICAL HAZARD:
0 (Water Reactivity: Materials that do not react with water. Organic Peroxides: Materials that are normally stable, even under fire-fighting conditions and will not react with water. Explosives: Substances that are Non-Explosive. Unstable Compressed Gases: No Rating. Pyrophorics: No Rating. Oxidizers: No "0" rating allowed. Unstable Reactives: Substances that will not polymerize, decompose, condense or self-react.); 1 (Water Reactivity: Materials that change or decompose upon exposure to moisture. Organic Peroxides: Materials that are normally stable, but can become unstable at high temperatures and pressures. These materials may react with water, but will not release energy. Explosives: Division 1.5 & 1.6 substances that are very insensitive explosives or that do not have a mass explosion hazard. Compressed Gases: Pressure below OSHA definition. Pyrophorics: No Rating. Oxidizers: Packaging Group III; Solids: any material that in either concentration tested, exhibits a mean burning time less than or equal to the mean burning time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I and II are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the pressure rise time of a 1:1 nitric acid (65%)/cellulose mixture and the criteria for Packing Group I and II are not met. Unstable Reactives: Substances that may decompose, condense or self-react, but only under conditions of high temperature and/or pressure and have little or no potential to cause significant heat generation or explosive hazard. Substances that readily undergo hazardous polymerization in the absence of inhibitors.);

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM
HAZARD RATINGS (continued):

PHYSICAL HAZARD (continued):
2 (Water Reactivity: Materials that may react violently with water. Organic Peroxides: Materials that, in themselves, are normally unstable and will readily undergo violent chemical change, but will not detonate. These materials may also react violently with water. Explosives: Division 1.4 – Explosive substances where the explosive effect are largely confined to the package and no projection of fragments of appreciable size or range are expected. An external fire must not cause virtually instantaneous explosion of almost the entire contents of the package. Compressed Gases: Pressure below OSHA definition but < 514.7 psi absolute at 21.1°C (70°F) [500 psig]. Pyrophorics: No Rating. Oxidizers: Packing Group II; Solids: any material that, either in concentration tested, exhibits a mean burning time of less than or equal to the mean burning time of a 2.3 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. Liquids: any material that exhibits a mean pressure rise time less than or equal to the mean pressure rise time of a 3:7 potassium bromate/cellulose mixture and the criteria for Packing Group I are not met. Unstable Reactives: Substances that may polymerize, decompose, condense, or self-react at ambient temperature and/or pressure, but have a low potential for significant heat generation or explosion. Substances that readily form peroxides upon exposure to air or oxygen at room temperature; 3 (Water Reactivity: Materials that may form explosive reactions with water. Organic Peroxides: Materials that are capable of detonation or explosive reaction, but require a strong initiating source, or must be heated under confinement before initiation; or materials that react explosively with water. Explosives: Division 1.2 – Explosive substances that have a fire hazard and either a minor blast hazard or a minor projection hazard or both, but do not have a mass explosion hazard. Compressed Gases: Pressure > 514.7 psi absolute at 21.1°C (70°F) [500 psig]. Pyrophorics: No Rating. Oxidizers: Packing Group III; Solids: any material that, in either concentration tested, exhibits a mean burning time less than the mean burning time of a 3:2 potassium bromate/cellulose mixture. Liquids: Any material that spontaneously ignites when mixed with cellulose in a 1:1 ratio, or which exhibits a mean pressure rise time less than the pressure rise time of a 1:1 perchloric acid (50%)/cellulose mixture. Unstable Reactives: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a moderate potential to cause significant heat generation or explosion.; 4 (Water Reactivity: Materials that react explosively with water without requiring heat or confinement. Organic Peroxides: Materials that are readily capable of detonation or explosive decomposition at normal temperature and pressures. Explosives: Division 1.1 & 1.2-explosive substances that have a mass explosion hazard or have a projection hazard. A mass explosion is one that affects almost the entire load instantaneously. Compressed Gases: No Rating. Pyrophorics: Add to the definition of Flammability “4”. Oxidizers: No “4” rating. Unstable Reactives: Substances that may polymerize, decompose, condense or self-react at ambient temperature and/or pressure and have a high potential to cause significant heat generation or explosion.); PPE Rating B. Hand and eye protection is mandatory for routine chemical use. Body protection may be required for routine chemical use.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS:
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).
DEFINITIONS OF TERMS (Continued)

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

FLAMMABILITY HAZARD: 0 Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand. 1 Materials that must be preheated before ignition can occur. Materials in this degree require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur. 2 Materials that must be moderately heated or exposed to relatively high ambient temperatures before ignition can occur. Materials in this degree would not under normal conditions form hazardous atmospheres with air, but under high ambient temperatures or under moderate heating could release vapor in sufficient quantities to produce hazardous atmospheres with air. 3 Liquids and solids that can be ignited under almost all ambient temperature conditions. Materials in this degree produce hazardous atmospheres with air under almost all ambient temperatures or, though unaffected by ambient temperatures, are readily ignited under almost all conditions. 4 Materials that will rapidly or completely vaporize at atmospheric pressure and normal ambient temperature or that are readily dispersed in air and will burn readily.

INSTABILITY HAZARD: 0 Materials that in themselves are normally stable, even under fire conditions. 1 Materials that in themselves are normally stable, but that can become unstable at elevated temperatures and pressures. 2 Materials that readily undergo violent chemical change at elevated temperatures and pressures. 3 Materials that in themselves are capable of detonation or explosive decomposition or explosive reaction, but that require a strong initiating source or that must be heated under confinement before ignition. 4 Materials that in themselves are readily capable of detonation or explosive decomposition or explosive reaction at normal temperatures and pressures.

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:

Human and Animal Toxicology: 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: LDo - Lethal Dose (solids & liquids) which kills 50% of the exposed animals; LC50 - Lethal Concentration (gases) which kills 50% of the exposed animals; ppm concentration expressed in parts of material per million parts of air or water; mg/m³ concentration expressed in weight of substance per volume of air, mg/kg quantity of material, by weight, administered to a test subject, based on their body weight in kg. Other measures of toxicity include TDo, the lowest dose to cause a symptom and TCo, the lowest concentration to cause a symptom; TDo, LC50, and LDo, or TC, TCo, LCo, and LCo, the lowest dose (or concentration) to cause lethal or toxic effects. Cancer Information: 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 Information: BEI - ACGIH 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. BCF = Bioconcentration Factor, which is used to determine if a substance will concentrate in lifeforms which consume contaminated plant or animal matter. TLm = median threshold limit; Coefficient of Oil/Water Distribution is represented by log Kow or log Koc and is used to assess a substance’s behavior in the environment.

REGULATORY INFORMATION:

U.S. and CANADA:

ACGIH: American Conference of Governmental Industrial Hygienists, a professional association which establishes exposure limits. This section explains the impact of various laws and regulations on the material. EPA is the U.S. Environmental Protection Agency. 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). 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/Nondomestic 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. This section also includes information on the precautionary warnings which appear on the material’s package label. OSHA - U.S. Occupational Safety and Health Administration.