SAFETY DATA SHEET

1. SECTION 1 – IDENTIFICATION OF THE SUBSTANCE/MIXTURE AND OF THE COMPANY/UNDERTAKING

<table>
<thead>
<tr>
<th>IDENTIFICATION of the SUBSTANCE or PREPARATION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CHEMICAL NAME: BROMOTRIFLUOROMETHANE</td>
</tr>
<tr>
<td>OTHER MEANS OF IDENTIFICATION/SYNONYMS: Refrigerant gas, R 13B1, F 13B1; F-13B1; FC 13B1; Fluorocarbon 1301; Freon 13B1; Freon 13B1; R 13B1; Trifluorobromomethane; Frigen 13B1; Refrigerant 13B1; Halocarbon 13B1; Monobromotrifluoromethane; R 13B1; Refrigerant 13B1; Trifluorobromomethane; Trifluorobromomethane; CF3Br; Trifluoromethyl bromide; Trifluoromonobromomethane</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RELEVANT PRODUCT USE:</th>
<th>Fire Extinguishing Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>USES ADVISED AGAINST:</td>
<td>Other than Relevant Use</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>COMPANY/UNDERTAKING IDENTIFICATION:</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. MANUFACTURER: H3R Clean Agents</td>
</tr>
<tr>
<td>ADDRESS: 103 H Street</td>
</tr>
<tr>
<td>Petaluma, CA, U.S.A. 94952</td>
</tr>
<tr>
<td>PHONE: 1-800/249-4289 (8:00 a.m. to 4:30 p.m. PST)</td>
</tr>
<tr>
<td>FAX: 1-707/765-3395</td>
</tr>
<tr>
<td>EUROPEAN SUPPLIER/Manufacturer's NAME:</td>
</tr>
<tr>
<td>ADDRESS:</td>
</tr>
<tr>
<td>BUSINESS PHONE:</td>
</tr>
<tr>
<td>WEB SITE: <a href="http://www.h3rcleanagents.com">www.h3rcleanagents.com</a></td>
</tr>
<tr>
<td>EMERGENCY PHONE: CHEMTREC: 1-800-424-9300 or 703-527-3887</td>
</tr>
</tbody>
</table>

DATE OF PREPARATION: October 21, 2011
DATE OF REVISION: August 28, 2015
This gas has been classified in accordance with the hazard criteria of the Canadian CPR and the SDS contains all the information required by the CPR. The compound is also classified per all applicable U.S. OSHA Hazcom, the European Union CLP EC 1272/2008 and the Global Harmonization Standard.

SECTION 2. HAZARD IDENTIFICATION


| Classification: Gases Under Pressure/Liquefied Gas |
| Signal Word: Warning |
| Hazard Statement Code: H280 |
| Precautionary Statement Codes: P410 + P403 |
| Hazard Symbol/Pictogram: GHS04 |

See Section 16 for full classification information for this product.

EMERGENCY OVERVIEW: Product Description: Halon 1301 is colorless and odorless or with a slightly ethereal odor and is shipped as liquid under its own vapor pressure. Health Hazards: The main acute health hazard associated with releases of this gas is asphyxiation by displacement of oxygen. This gas is heavier than air and will sink into low areas, creating an asphyxiation hazard. The main chronic health hazard associated with releases of this gas is possible adverse effects to the central nervous system and possible cardiac sensitization and arrhythmias. Chronic skin exposure may cause dermatitis. Flammability Hazards: This gas is not flammable, but can decompose at very high temperatures forming toxic gases such as hydrogen bromide, hydrogen fluoride and bromine. Cylinders or tanks may rupture and explode if heated. Reactivity Hazards: This material is not reactive. Environmental Hazards: This gas is a known ozone depletor and contributes to the destruction of the ozone. Emergency Response Considerations: Emergency responders must wear the proper personal protective equipment suitable for the situation to which they are responding. WARNING—If rescue personnel need to enter an area suspected of having a low level of Oxygen, they should be equipped with Self-Contained Breathing Apparatus (SCBA) and appropriate personal protective equipment.

SECTION 3. COMPOSITION and INFORMATION ON INGREDIENTS

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>Chemical Formula</th>
<th>CAS #</th>
<th>EINECS #</th>
<th>% Composition</th>
<th>LABEL ELEMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bromotrifluoromethane</td>
<td>CBrF₃</td>
<td>75-63-8</td>
<td>200-887-6</td>
<td>&gt; 99%</td>
<td>SELF-CLASSIFICATION</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>GHS under U.S. OSHA &amp; EU Classification (1272/2008 EC)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Hazard Statement Codes</td>
</tr>
</tbody>
</table>

See Section 16 for full product classification information.
SECTION 4. FIRST AID MEASURES

PROTECTION OF FIRST AID RESPONDERS: RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS GAS WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. Self-Contained Breathing Apparatus should be worn if the level of oxygen cannot be determined. Rescuers should be taken for medical attention, if necessary. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation, if necessary.

DESCRIPTION OF FIRST AID MEASURES: Remove victim(s) to fresh air, as quickly as possible. Take copy of label and SDS to physician or other health professional with victim(s).

Inhalation Exposure: If inhaled, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if adverse effect occurs after removal to fresh air.

Skin Exposure: If this gas contaminates the skin, immediately begin decontamination with running water. Minimum flushing is for 20 minutes. Remove exposed or contaminated clothing, taking care not to contaminate eyes. Victim must seek immediate medical attention. Remove any clothing that may restrict circulation to any frozen area. Do not rub frozen parts as tissue damage may occur. As soon as practicable, place any affected area in warm water bath which has a temperature that does not exceed 105°F (40°C). NEVER USE HOT WATER. NEVER USE DRY HEAT. If area of frostbite is extensive, and if possible, remove clothing while showering with warm 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 of the body in the armpit. Encourage victim to gently exercise the affected part while being warmed. Frozen tissue is painless and appears waxy, with a possible yellow color. Frozen tissue will become swollen, painful and prone to infection when thawed. If the frozen part of the body has been thawed by the medical attention has been obtained, cover the area with a dry sterile dressing and a large bulky protective covering.

Eye Exposure: If mechanical injury occurs, cover eye with bandage and seek appropriate medical attention. If rapid release has caused frostbite, cover injured eye; an ophthalmologist should be sought as soon as possible.

Ingestion: Ingestion is an unlikely route of exposure for this gas.

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None are anticipated.

INDICATION OF IMMEDIATE MEDICAL ATTENTION AND SPECIAL TREATMENT IF NEEDED: Administer oxygen, if necessary, and treat symptoms. This gas is an asphyxiant and can induce cardiac muscle sensitization to circulating epinephrine-like compounds. Do NOT give adrenaline or similar sympathomimetic drugs. Do NOT allow victim to exercise until 24 hours following specific exposures. Freeze burns of mucosal tissue can develop following specific exposures.

SECTION 5. FIRE FIGHTING MEASURES

FLASH POINT: Not Applicable

AUTOIGNITION: Not Applicable

FLAMMABLE RANGE: Not Applicable

EXTINGUISHING MEDIA: This is a non-flammable gas; use fire-extinguishing media appropriate for the surrounding materials.

UNSUITABLE FIRE EXTINGUISHING MEDIA: None known.

SPECIFIC HAZARDS ARISING FROM THE CHEMICAL: Bromotrifluoromethane is not combustible. Bromotrifluoromethane, in ambient total-flooding fire extinguishing systems can produce a dense fog (if relative humidity is about 50%) which may reduce visibility for a few seconds and delay evacuation in occupational areas. Containers, when involved in fire, may rupture or burst in the heat of the fire. Most cylinders have a pressure release device, which will vent contents if the cylinder is exposed to high temperatures. This gas is heavier than air, creating an asphyxiating hazard in low areas.

EXPLOSION SENSITIVITY TO MECHANICAL IMPACT: Not sensitive.

EXPLOSION SENSITIVITY TO STATIC DISCHARGE: Not sensitive.

HAZARDOUS COMBUSTION PRODUCTS: Combustion or decomposition products above 538°C (1000.4°F) irritating/toxic gases such as hydrogen bromide, hydrogen fluoride and bromine may be generated. These by-products have a sharp irritating odor and are dangerous even in low concentrations and in sufficient concentrations can result in personal injury or death.

SPECIAL PROTECTIVE ACTIONS FOR FIRE-FIGHTERS: Move fire-exposed containers if it can be done without risk to firefighters. Use water spray to cool fire-exposed cylinders. Take care not to block pressure relief valves. Stay away from ends of tanks (but realize that shrapnel may travel in any direction). Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire.

SECTION 6. ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS AND EMERGENCY PROCEDURES: Evacuate immediate area. Uncontrolled releases should be responded to by trained personnel using pre-planned procedures. Vapors from liquefied gas are initially heavier than air and spread along ground, creating an oxygen-deficient atmosphere is low-lying areas or confined spaces. Detection systems should be available to monitor for level of oxygen. The level of oxygen should be above 19.5% before personnel can be allowed in the area without SCBA.

PERSONAL PROTECTIVE EQUIPMENT: Proper protective equipment should be used.

All Releases: Minimum Personal Protective Equipment should be Level B: Self-Contained Breathing Apparatus. Note: chemically protective clothing may provide little or no thermal protection against the hazard of frostbite. The atmosphere must at least 19.5 percent Oxygen before non-emergency personnel can be allowed in the area without Self-Contained Breathing Apparatus and fire protection. If gas is leaking incidentally from the cylinder or its valve, contact your supplier.
METHODS FOR CLEAN-UP AND ContAINMENT:

All Releases: In the event of a release of this product, operator should close the gas source if possible to do so safely. Evacuate area in the event of a significant release. Locate and seal the source of the leaking gas. If leak is in user’s gas handling equipment or system, close cylinder valve, and safely vent high pressure before attempting repairs. If leak is from the cylinder, cylinder valve or the valve pressure relief device (PRD), contact your supplier. 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. Call CHEMTREC (1-800-424-9300) for emergency assistance. Or if in Canada, call CANUTEC (613-996-6666).

ENVIRONMENTAL PRECAUTIONS: All release to the environment should be avoided as this material has an ozone depletion potential and a global warming potential. Run-off water may be contaminated by other materials and should be contained to prevent possible environmental damage.

REFERENCE TO OTHER SECTIONS: See information in Section 8 (Exposure Controls – Personal Protection) and Section 13 (Disposal Considerations) for additional information.

SECTION 7. HANDLING AND STORAGE

PRECAUTIONS FOR SAFE HANDLING: Releases of Halon 1301 can create an oxygen-deficient atmosphere. Be aware of any signs of dizziness or fatigue; exposures to fatal concentrations of Helium-3 could occur without any significant warning symptoms, due to oxygen-deficiency. All work operations should be monitored in such a way that emergency personnel can be immediately contacted in the event of a release. Wearing contact lenses is not recommended when handling this gas.

Cylinder valves should be inspected regularly for physical damage or corrosion (apparent by discoloration or rust). Care should be taken to inspect the following valve locations for corrosion: neck (where valve inserts into cylinder); bonnet nut (where handle attaches to valve body). Close valve after each use and when empty. Do not drag, roll, slide or drop cylinder. Use a suitable hand truck designed for cylinder movement. Never attempt to lift cylinder by its cap. Secure cylinders at all times while in use. Use a pressure regulator to safely discharge product from cylinder. Use a check valve to prevent reverse flow into cylinder. Once cylinder has been connected to properly purged process, open cylinder valve slowly to prevent reverse flow into cylinder. Do not insert any object (e.g., wrench, screwdriver, etc.) into valve cap openings; doing so may damage valve, causing a leak to occur. Use an adjustable strap-wrench to remove over-tight or rusted caps.

Do not heat cylinders by any means to increase the discharge rate of product from the cylinder. Never apply flame or localized heat directly to any part of the cylinder. Cylinders should not be artifically cooled as certain types of steel undergo property changes when cryogenically cooled, thus making the cylinder unstable.

CONDITIONS FOR SAFE STORAGE: Always store and handle compressed gas cylinders in accordance with Compressed Gas Association, Inc. at www.cganet.com pamphlet CGA P-1, Safe Handling of Compressed Gases in Containers. Local regulations may require specific equipment for storage and use. 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. Cylinders should be stored in dry, well-ventilated areas away from sources of heat, ignition and direct sunlight. Do not allow area where cylinders are stored to exceed 52°C (125°F). Store containers away from heavily trafficked areas and emergency exits. Isolate from other non compatible chemicals (refer to Section 10, Stability and Reactivity). Store away from process and production areas, away from elevators, building and room exits or main aisles leading to exits. Protect cylinders against physical damage. Full and empty cylinders should be segregated. Use a first-in, first-out inventory systems to prevent full containers from being stored for long periods of time. NOTE: Use only DOT or ASME code cylinders designed for compressed gas storage. Cylinders must not be recharged except by or with the consent of owner.

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA: Use the proper CGA connections, DO NOT USE ADAPTERS;

PRODUCT USE: This product is used as a fire-extinguishing agent, refrigerant gas and as a cleaning agent.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Relieve pressure before attempting repairs.

SECTION 8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS/CONTROL PARAMETERS:

Ventilation and Engineering Controls: Forced ventilation systems for the general work area should be provided. If appropriate, install automatic monitoring equipment to detect the level of oxygen.

Occupational/Workplace Exposure Limits/Guidelines:

<table>
<thead>
<tr>
<th>Chemical Name</th>
<th>CAS #</th>
<th>OSHA PELs ppm</th>
<th>ACGIH TLVs ppm</th>
<th>NIOSH RELs ppm</th>
<th>NIOSH IDLH ppm</th>
<th>DFG MAKs ppm</th>
<th>AIHA WEELs ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Halon 1301</td>
<td>75-63-8</td>
<td>TWA = 1000</td>
<td>TWA = 1000</td>
<td>TWA = 1000</td>
<td>40,000</td>
<td>TWA = 1000</td>
<td>PEAK = 5× MAK, average, 1-hr interval, 4 per shift</td>
</tr>
</tbody>
</table>

NE = Not Established

International Exposure Limits: Currently, the following international exposure limits are in place for Halon 1301 (specific country limits may become available or change/consult individual countries for most current information).

Australia: TWA = 1000 ppm (6090 mg/m³), JUL 2008
Australia: MAK-TMW = 1000 ppm (6010 mg/m³); KZW = 2000 ppm (12,200 mg/m³), 2007
Belgium: TWA = 1000 ppm (6178 mg/m³), MAR 2002
Denmark: TWA = 1000 ppm (6100 mg/m³), MAY 2011
Finland: TWA = 1000 ppm (6200 mg/m³), STEL = 1300 ppm (8000 mg/m³), NOV2011
France: VME = 1000 ppm (6100 mg/m³), FEB 2006
Germany: MAK = 1000 ppm (6200 mg/m³), 2011
Iceland: TWA = 1000 ppm (6100 mg/m³), NOV 2011

Korea: TWA = 1000 ppm (6100 mg/m³), 2006
Mexico: TWA = 1000 ppm (6100 mg/m³); STEL = 1200 ppm, 2004
The Netherlands: MAC-TGG = 6100 mg/m³, 2003
New Zealand: TWA = 1000 ppm (6090 mg/m³), JAN 2002
Peru: TWA = 1000 ppm (6091 mg/m³), JUL 2005
The Philippines: TWA = 1000 ppm (6100 mg/m³), JAN 1993
Russia: STEL 3000 mg/m³, JUN 2003
Switzerland: MAK-W = 1000 ppm (6100 mg/m³), JAN2011
Turkey: TWA 1000 ppm (6100 mg/m³), JAN 1993

In Argentina, Bulgaria, Colombia, Jordan, Singapore, Vietnam check ACGIH TLV.
PERSONAL PROTECTIVE EQUIPMENT: The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132), equivalent standards of Canada (including CSA Standard Z94.4-02 and CSA Standard Z94.3-02), or standards of EU member states (including EN 529:2005 for respiratory PPE, CEN/TR 15419:2006 for hand protection, and CR 13464;1999 for face/eye protection). Please reference applicable regulations and standards for relevant details.

Respiratory Protection: Maintain oxygen levels above 19.5% in the workplace. Use supplied air respiratory protection if oxygen level is below 19.5%, or during emergency response to a release of this product. If necessary, use only respiratory protection authorized under appropriate regulations. In the U.S., 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 U.S. NIOSH respiratory protective equipment guidelines for this gas.

BROMOTRIFLUOROMETHANE

CONCENTRATION RESPIRATORY PROTECTION
Up to 10,000 ppm: Any Supplied-Air Respirator (SAR).
Up to 25,000 ppm: Any SAR operated in a continuous-flow mode.
Up to 40,000 ppm: Any SAR that has a tight-fitting facepiece and is operated in a continuous-flow mode, or any Self-Contained Breathing Apparatus (SCBA) with a full facepiece, or any SAR 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 Air-Purifying, Full-Facepiece Respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister, or any appropriate escape-type, SCBA.

Eye Protection: Use approved safety goggles or safety glasses. If necessary, refer to appropriate regulations for further information.

Hand Protection: Wear leather gloves when handling cylinders. Otherwise, wear glove protection appropriate to the specific operation for which this gas is used. If necessary, refer to appropriate regulations.

Body Protection: Use body protection appropriate for task. Safety shoes are recommended when handling cylinders. If a hazard 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 appropriate country regulations and standards.

SECTION 9. PHYSICAL AND CHEMICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Halon 1301</th>
</tr>
</thead>
<tbody>
<tr>
<td>Form</td>
<td>Liquefied gas</td>
</tr>
<tr>
<td>Color</td>
<td>Colorless</td>
</tr>
<tr>
<td>Odor</td>
<td>Odorless to slightly ethereal</td>
</tr>
<tr>
<td>Molecular Weight</td>
<td>148.91</td>
</tr>
<tr>
<td>Molecular Formula</td>
<td>CBrF₃</td>
</tr>
<tr>
<td>Boiling Point @ 760 mmHg</td>
<td>-57.8°C (-27.6°F)</td>
</tr>
<tr>
<td>Freezing/Melting Point @ 1 atm</td>
<td>-172°C (-142.8°F)</td>
</tr>
<tr>
<td>Gas Specific Gravity [Relative Density] (water = 1) @ 20°C</td>
<td>1.5800 g/mL</td>
</tr>
<tr>
<td>Liquid Specific Gravity [Relative Density] (water = 1) @ 20°C</td>
<td>1.5800 g/mL</td>
</tr>
<tr>
<td>Solubility in Water @ 25°C</td>
<td>Practically insoluble (0.03% by weight)</td>
</tr>
<tr>
<td>Other Solubilities</td>
<td>Soluble in chloroform</td>
</tr>
<tr>
<td>Vapor Pressure @ 20°C</td>
<td>10755 mmHg (1434 kPa)</td>
</tr>
<tr>
<td>Vapor Density (air = 1)</td>
<td>5.7</td>
</tr>
<tr>
<td>Odor Threshold</td>
<td>Not determined</td>
</tr>
<tr>
<td>Critical Temperature</td>
<td>67°C (152.6°F)</td>
</tr>
<tr>
<td>Critical Pressure</td>
<td>4032 kPa (39.8 atm)</td>
</tr>
<tr>
<td>Liquid Viscosity @ 25°C</td>
<td>0.157 mPa.s</td>
</tr>
<tr>
<td>Octanol/Water Partition Coefficient</td>
<td>log Kow= 1.86</td>
</tr>
<tr>
<td>Henry's Law Constant @ 25°C</td>
<td>0.4994 atm-cu m/mole</td>
</tr>
</tbody>
</table>

WARNING PROPERTIES FOR THIS GAS: The odor is not a good warning of a release. 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.

SECTION 10. STABILITY AND REACTIVITY

CHEMICAL STABILITY: Stable.

CONDITIONS TO AVOID: Cylinders should not be exposed to temperatures in excess of 125°F (52°C).

MATERIALS WITH WHICH GAS IS INCOMPATIBLE: Chemically active metals (e.g. sodium, potassium, calcium, powdered aluminum, zinc, magnesium).

HAZARDOUS DECOMPOSITION PRODUCTS: Combustion: Decomposes above 538°C (1000.4°F). Forms hydrogen bromide, hydrogen fluoride and free bromine. In air, carbonyl fluoride and carbonyl bromide may form. Hydrolysis: At high temperature and in the presence of water, this gas may form acids (by hydrolysis or by catalytic decomposition) which may attack metallic surfaces.

POSSIBILITY OF HAZARDOUS REACTION OR POLYMERIZATION: Will not occur.
SECTION 11. TOXICOLOGICAL INFORMATION

HALON 1301

ROUTES OF ENTRY, SYMPTOMS OF ACUTE EXPOSURE: WARNING: If rescue personnel need to enter an area in which a release of Halon 1301 has occurred they should be equipped with Self-Contained Breathing Apparatus (SCBA) and appropriate personal protective equipment. High concentration of this gas will create an oxygen-deficient atmosphere, creating the risk of asphyxiation.

Eye Contact: Release of a high-pressure gas may result in airborne objects.

Ingestion: Ingestion of this gas is not a likely route of industrial exposure.

Inhalation: Inhalation of high concentrations of this gas may lead to heart arrhythmias. High concentrations of this gas can 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 may have a blue color. Under some circumstances of over-exposure, death may occur, due to the displacement of oxygen. The effects associated with various levels of oxygen are described below.

**CONCENTRATION of OXYGEN**

<table>
<thead>
<tr>
<th>CONCENTRATION</th>
<th>EXPOSURE SYMPTOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.9% Oxygen:</td>
<td>Normal oxygen concentration in air.</td>
</tr>
<tr>
<td>15–19% Oxygen:</td>
<td>Decreased ability to perform tasks. May impair coordination and may induce early symptoms in persons with heart, lung, or circulatory problems.</td>
</tr>
<tr>
<td>12–15% Oxygen:</td>
<td>Breathing increases, especially in exertion. Pulse up. Impaired coordination, perception, and judgment.</td>
</tr>
<tr>
<td>10–12% Oxygen:</td>
<td>Breathing further increases in rate and depth, poor coordination and judgment, lips slightly blue.</td>
</tr>
<tr>
<td>8–10% Oxygen:</td>
<td>Mental failure, fainting, unconsciousness, ashén face, blueness of lips, nausea (upset stomach), and vomiting.</td>
</tr>
<tr>
<td>6–8% Oxygen:</td>
<td>8 minutes, may be fatal in 50–100% of cases; 6 minutes, may be fatal in 25 to 50% of cases; 4–5 minutes, recovery with treatment.</td>
</tr>
<tr>
<td>4–6% Oxygen:</td>
<td>Coma in 40 seconds, followed by convolution, breathing failure, death.</td>
</tr>
</tbody>
</table>

**WARNING:** Exposure to atmospheres containing 8–10% or less oxygen will bring about unconsciousness without warning and so quickly that individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death.

Skin Contact: Transitory skin contact should not cause any adverse effects.

Other Acute Health Effects: Contact with rapidly expanding gases (which are released from under high pressure) may cause frostbite. Symptoms of frostbite include change in skin color to white or grayish-yellow. The pain caused by frostbite can quickly subside, masking the injury. In addition, the sudden release of a pressurized gas (such as may occur in the event of a valve failure), presents a severe hazard of mechanical injury.

Acute Exposure Target Organs: Respiratory system.

**ROUTES OF ENTRY, SYMPTOMS OF CHRONIC EXPOSURE:**

Inhalation: No specific data are available for this gas. Chronic exposure to oxygen-deficient atmospheres (below 18% oxygen in air) may affect the heart and nervous system. Inhalation of very high concentration may cause adverse effects on the central nervous system.

Skin Contact: Prolonged contact may cause dermatitis (dry, red, cracked skin) due to defatting of the skin.

Chronic Exposure Target Organs: Skin, cardiac system, central nervous system.

**CARCINOGENIC POTENTIAL:** Halon 1301 is not listed as a carcinogen or as a potential carcinogen on EPA, NIOSH, GERMAN MAK, OSHA, NTP, IARC, or CAL/OSHA Carcinogen lists.

**TOXICITY DATA:** There is no toxicity data available for Halon 1301.

**ADDITIONAL TOXICOLOGICAL DATA:** Bromotrifluoromethane is low in toxicity. However, exposure to high concentrations (about 5-17% [50,000-170,000 ppm]) can affect the central nervous system and cause light-headedness, numbness, tingling and a feeling of drunkenness. Other symptoms reported include slight decrease in judgment, alertness, or coordination, buzzing in the ears, and a feeling of gradual loss of consciousness. There are no experimental or occupational reports of unconsciousness. Effects are temporary with rapid recovery upon breathing fresh air. Exposure to high levels (over 15% [150,000 ppm] for 15 to 25 minutes) can cause irregular heartbeat (arrhythmia).
SECTION 11. TOXICOLOGICAL INFORMATION (Continued)

ADDITIONAL TOXICOLOGICAL DATA (continued):

Human volunteers exposed to concentrations of 1-10% (10,000 - 100,000 ppm) for 3.0 to 3.5 minutes did not experience heart effects. Reports of occupational exposures to Bromotrifluoromethane are generally the result of accidental release from a total flooding fire extinguishing system. Since most fire extinguishing systems only reach 5-7% (50,000-70,000 ppm) Bromotrifluoromethane in air, effects should not develop.

IRRITATION OF PRODUCT: Not applicable. 

SENSITIZATION OF PRODUCT: Halon 1301 is not a human skin or respiratory sensitizer, but has been shown to be a cardiac sensitizer in animal studies.

REPRODUCTIVE TOXICITY INFORMATION: Halon 1301 is not reported to cause mutagenic, embryotoxic, teratogenic or reproductive toxicity effects in humans. No animal data are available.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) have not been determined for Halon 1301.

SECTION 12. ECOLOGICAL INFORMATION

MOBILITY: The Koc of Bromotrifluoromethane is estimated as 49, using a log Kow of 1.86 and a regression-derived equation. According to a classification scheme, this estimated Koc value suggests that Bromotrifluoromethane is expected to have very high mobility in soil.

PERSISTENCE AND BIODEGRADABILITY: If released to air, a vapor pressure of 1.22X10^4 mm Hg at 25°C indicates Bromotrifluoromethane will exist solely in the gas phase in the ambient atmosphere. Gas-phase Bromotrifluoromethane will be degraded slowly in the atmosphere by reaction with photochemically-produced hydroxyl radicals; the half-life of this reaction in air is estimated to be greater than 44 years. The primary decomposition process to occur in the stratosphere is UV photolysis. It has an estimated photolysis half-life of 72 yrs in the ambient atmosphere. If released to soil, Bromotrifluoromethane is expected to have very high mobility based upon an estimated Koc of 49. Volatilization from moist soil surfaces is expected to be an important fate process based upon a Henry's Law constant of 0.499 atm-cu m/mole. If released into water, Bromotrifluoromethane is not expected to adsorb to suspended solids and sediment in the water based upon the estimated Koc. Volatilization from water surfaces is expected to be an important fate process based upon this compound's Henry's Law constant. Estimated volatilization half-lives for a model river and model lake are 1.2 hrs and 48 days, respectively. Based upon the high degree of stability, Bromotrifluoromethane biodegradation is expected to be slow. Hydrolysis is not expected to occur due to the lack of hydrolyzable functional groups.

POTENTIAL TO BIOACCUMULATE: An estimated BCF of 5.4 suggests the potential for bioconcentration in aquatic organisms is low.

ECOTOXICITY: Immediate adverse effect on plants would be related to oxygen-deficient environments or frost from rapidly expanding gases, unless exposure occurs in a confined space. There is currently no evidence of adverse effects from exposure to Halon 1301 on aquatic life.

OZONE-DEPLETION POTENTIAL: Halon 1301 is a Class I, Group II, Ozone Depleting Chemical per U.S. 40 CFR Part 82. Halon 1301 may contribute to global warming.

ENVIRONMENTAL EXPOSURE CONTROLS: Controls should be engineered to prevent release to the environment, including procedures to prevent spills, atmospheric release and release to waterways.

RESULTS OF PBT and vPvB ASSESSMENT: No data available. PBT and vPvB assessments are part of the chemical safety report required for some substances in European Union Regulation (EC) 1907/2006, Article 14.

SECTION 13. DISPOSAL CONSIDERATIONS

PRECAUTIONS TO BE FOLLOWED DURING WASTE HANDLING: Wear proper protective equipment when handling waste materials.

UNUSED PRODUCT / EMPTY CONTAINER: Do not dispose of residual product. Return used product in cylinders to H3R Clean Agents.

DISPOSAL INFORMATION: Relative to the environment, this material has an ozone depletion potential and a global warming potential. Refer to the regulations of the U.S. EPA or the State-specific regulations for proper waste disposal, regulations of Canada and its Provinces, or regulations of EU member states.

U.S. EPA WASTE NUMBER: Not applicable.

EUROPEAN (EWC) WASTE CODES: 16 05 04* gases in pressure containers (including halons) containing dangerous substances

SECTION 14. TRANSPORT INFORMATION

The following classification applies when this product is supplied as a fire extinguisher.

U.S. SHIPPING INFORMATION: This gas is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

UN Identification Number: UN 1044

U.S. DOT Proper Shipping Name: Fire extinguisher with compressed or liquefied gas

Hazard Class Number and Description: 2.2 (Non-Flammable Gas)

U.S. DOT Shipping Label(s) Required: Class 2.2 (Non-Flammable Gas)

Packing Group: Not Applicable

Placard (When required): Class 2.2 (Non-Flammable Gas)

Special Shipping Information: Cylinders should be transported in a secure position in a well-ventilated truck (never transport in passenger compartment of a vehicle). Ensure cylinder valve is properly closed, valve outlet cap has been reinstalled, and valve protection cap is secured before shipping cylinder.
The following classification applies when this product is supplied as a fire extinguisher.

U.S. SHIPPING INFORMATION (continued):

Caution: Compressed gas cylinders shall not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with the owner’s written consent is a violation of Federal law (49 CFR 173.301).

ERG (Emergency Response Guidebook) #: 126

Special Provisions: T50 Portable tanks - Applies to various liquefied compressed gases: Consult the regulations for specific requirements Sec. 172.102 Special Provision Portable Tank Code T50.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is classified 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.

UN Identification Number: UN 1044
Proper Shipping Name: Fire extinguisher with compressed or liquefied gas
Hazard Class Number and Description: 2.2 (Non-Flammable Gas)
Packing Group: None
Excepted Quantities: E0
Hazard Shipping Label(s) Required: Class 2.2 (Non-Flammable Gas)
Special Provisions: 109
Explosive Limit & Limited Quantity Index: 0.125 L
ERAP Index: None
Passenger Carrying Ship Index: None
Passenger Carrying Road Or Rail Vehicle Index: 75

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This gas is classified as dangerous goods, per the International Air Transport Association.

UN Identification Number: UN 1044
Proper Shipping Name/Description: Fire extinguisher with compressed or liquefied gas
Hazard Class or Division: 2.2 (Non-Flammable Gas)
Hazard Label(s) Required: Class 2.2 (Non-Flammable Gas)
Packing Group: None
Excepted Quantities: E0
Passenger and Cargo Aircraft Packing Instruction: 213
Passenger and Cargo Aircraft Maximum Net Quantity per Pkg.: 75 Kg
Passenger and Cargo Aircraft Limited Quantity Packing Instruction: Forbidden
Passenger and Cargo Aircraft Limited Quantity Maximum Net Quantity per Pkg.: Forbidden
Cargo Aircraft Only Packing Instruction: 213
Cargo Aircraft Only Maximum Net Quantity per Pkg.: 150 Kg
Special Provisions: A19
ERG CODE: 2L

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This gas is classified as dangerous goods, per the International Maritime Organization.

UN No.: 1044
Proper Shipping Name: Fire extinguisher with compressed or liquefied gas
Hazard Class: 2
Packing: None
Special Provisions: None
Limited Quantities: 120 mL
Excepted Quantities: E0
Packing: Instructions: P200; Provisions: None
IBCs: Instructions: None; Provisions: None
Tanks: Instructions: None; Provisions: None
EnS: F-C, S-V
Stowage Category: Category A.
Marine Pollutant: This gas does not meet the criteria of a Marine Pollutant.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This gas is classified by the Economic Commission for Europe to be dangerous goods.

UN No.: 1044
Name and Description: Fire extinguisher with compressed or liquefied gas
Class: 2
Classification Code: 6A
Packing Group: None
Labels: 2.2
Special Provisions: 225, 594
Limited Quantities: 120 mL
SECTION 14. TRANSPORT INFORMATION (Continued)

The following classification applies when this product is supplied as a fire extinguisher.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (continued):

**Excepted Quantities:** E0  
**Packing Instructions:** P200  
**Special Packing Instructions:** PP91  
**Mixed Packing Provisions:** MP9  
**Portable Tank and Bulk Container:** Instructions: None; Special Provisions: None  
**Hazard Identification No.:** None

The following classification applies when this product is charged with nitrogen, carbon dioxide or air.

**U.S. SHIPPING INFORMATION:** This gas is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

- **UN Identification Number:** UN 1058  
- **U.S. DOT Proper Shipping Name:** Liquefied gas, non-flammable, charged with nitrogen, carbon dioxide or air  
- **Hazard Class Number and Description:** 2.2 (Non-Flammable Gas)  
- **U.S. DOT Shipping Label(s) Required:** Class 2.2 (Non-Flammable Gas)  
- **Packing Group:** Not Applicable  
- **Placard (When required):** Class 2.2 (Non-Flammable Gas)  
- **Special Shipping Information:** Cylinders should be transported in a secure position in a well-ventilated truck (never transport in passenger compartment of a vehicle). Ensure cylinder valve is properly closed, valve outlet cap has been reinstalled, and valve protection cap is secured before shipping cylinder.  
- **Caution:** Compressed gas cylinders shall not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with the owner’s written consent is a violation of Federal law (49 CFR 173.301).  
- **ERG (Emergency Response Guidebook) #:** 126  
- **Special Provisions:** T50 Portable tanks - Applies to various liquefied compressed gases: Consult the regulations for specific requirements Sec. 172.102 Special Provision Portable Tank Code T50.

**TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:** This product is classified 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.

- **UN Identification Number:** UN 1058  
- **Proper Shipping Name:** Liquefied gas, non-flammable, charged with nitrogen, carbon dioxide or air  
- **Hazard Class Number and Description:** 2.2 (Non-Flammable Gas)  
- **Packing Group:** Not Applicable  
- **Exceptional Quantities:** E1  
- **Hazard Label(s) Required:** Class 2.2 (Non-Flammable Gas)  
- **Special Provisions:** None  
- **Explosive Limit & Limited Quantity Index:** 0.125 L  
- **ERAP Index:** None  
- **Passenger Carrying Ship Index:** None  
- **Passenger Carrying Road Or Rail Vehicle Index:** 75

**INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA):** This gas is classified as dangerous goods, per the International Air Transport Association.

- **UN Identification Number:** UN 1058  
- **Proper Shipping Name/Description:** Liquefied gas, non-flammable, charged with nitrogen, carbon dioxide or air  
- **Hazard Class or Division:** 2.2 (Non-Flammable Gas)  
- **Hazard Label(s) Required:** Class 2.2 (Non-Flammable Gas)  
- **Packing Group:** None  
- **Exceptional Quantities:** E1  
- **Passenger and Cargo Aircraft Packing Instruction:** 213  
- **Passenger and Cargo Aircraft Maximum Net Quantity per Pkg.:** 75 Kg  
- **Passenger and Cargo Aircraft Limited Quantity Packing Instruction:** Forbidden  
- **Cargo Aircraft Only Packing Instruction:** 213  
- **Cargo Aircraft Only Maximum Net Quantity per Pkg.:** 150 Kg  
- **Special Provisions:** A19  
- **ERG CODE:** 2L

**INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO):** This gas is classified as dangerous goods, per the International Maritime Organization.

- **UN No.:** 1058  
- **Proper Shipping Name:** Liquefied gas, non-flammable, charged with nitrogen, carbon dioxide or air  
- **Hazard Class Number:** 2.2  
- **Packing Group:** None  
- **Special Provisions:** 225
The following classification applies when this product is charged with nitrogen, carbon dioxide or air.

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (continued):

<table>
<thead>
<tr>
<th>Limited Quantities:</th>
<th>120 mL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excepted Quantities:</td>
<td>E1</td>
</tr>
<tr>
<td>Packing:</td>
<td>Instructions: P003; Provisions: None</td>
</tr>
<tr>
<td>IBCs:</td>
<td>Instructions: None; Provisions: None</td>
</tr>
<tr>
<td>Tanks:</td>
<td>Instructions: None; Provisions: None</td>
</tr>
<tr>
<td>EmS:</td>
<td>F-C, S-V</td>
</tr>
<tr>
<td>Stowage Category:</td>
<td>Category A.</td>
</tr>
<tr>
<td>Marine Pollutant:</td>
<td>This gas does not meet the criteria of a Marine Pollutant.</td>
</tr>
</tbody>
</table>

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This gas is classified by the Economic Commission for Europe to be dangerous goods.

<table>
<thead>
<tr>
<th>UN No.:</th>
<th>1058</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name and Description:</td>
<td>Liquefied gas, non-flammable, charged with nitrogen, carbon dioxide or air</td>
</tr>
<tr>
<td>Class:</td>
<td>2</td>
</tr>
<tr>
<td>Classification Code:</td>
<td>2A</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>None</td>
</tr>
<tr>
<td>Labels:</td>
<td>2.2</td>
</tr>
<tr>
<td>Special Provisions:</td>
<td>662</td>
</tr>
<tr>
<td>Limited Quantities:</td>
<td>120 mL</td>
</tr>
<tr>
<td>Excepted Quantities:</td>
<td>E1</td>
</tr>
<tr>
<td>Packing Instructions:</td>
<td>P200</td>
</tr>
<tr>
<td>Special Packing Instructions:</td>
<td>None</td>
</tr>
<tr>
<td>Mixed Packing Provisions:</td>
<td>MP9</td>
</tr>
<tr>
<td>Portable Tank and Bulk Container:</td>
<td>Instructions: (M); Special Provisions: None</td>
</tr>
<tr>
<td>Hazard Identification No.:</td>
<td>None</td>
</tr>
</tbody>
</table>

The following shipping classification applies when the product is supplied in types of cylinders other than fire extinguishers:

U.S. SHIPPING INFORMATION: This gas is classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

<table>
<thead>
<tr>
<th>UN Identification Number:</th>
<th>UN 1009</th>
</tr>
</thead>
<tbody>
<tr>
<td>U.S. DOT Proper Shipping Name:</td>
<td>Bromotrifluoromethane (Refrigerant gas R 13B1)</td>
</tr>
<tr>
<td>Hazard Class Number and Description:</td>
<td>2.2 (Non-Flammable Gas)</td>
</tr>
<tr>
<td>U.S. DOT Shipping Label(s) Required:</td>
<td>Class 2.2 (Non-Flammable Gas)</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Placard (When required):</td>
<td>Class 2.2 (Non-Flammable Gas)</td>
</tr>
<tr>
<td>ERG (Emergency Response Guidebook) #:</td>
<td>126</td>
</tr>
</tbody>
</table>

Special Shipping Information: Cylinders should be transported in a secure position in a well-ventilated truck (never transport in passenger compartment of a vehicle). Ensure cylinder valve is properly closed, valve outlet cap has been reinstalled, and valve protection cap is secured before shipping cylinder.

Caution: Compressed gas cylinders shall not be refilled except by qualified producers of compressed gases. Shipment of a compressed gas cylinder which has not been filled by the owner or with the owner’s written consent is a violation of Federal law (49 CFR 173.301).

Special Provisions: T50 Portable tanks - Applies to various liquefied compressed gases: Consult the regulations for specific requirements Sec. 172.102 Special Provision Portable Tank Code T50.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: This product is classified 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.

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</thead>
<tbody>
<tr>
<td>Proper Shipping Name:</td>
<td>Bromotrifluoromethane (Refrigerant gas R 13B1)</td>
</tr>
<tr>
<td>Hazard Class Number and Description:</td>
<td>2.2 (Non-Flammable Gas)</td>
</tr>
<tr>
<td>Packing Group:</td>
<td>Not Applicable</td>
</tr>
<tr>
<td>Excepted Quantities:</td>
<td>E1</td>
</tr>
<tr>
<td>Hazard Shipping Label(S) Required:</td>
<td>Class 2.2 (Non-Flammable Gas)</td>
</tr>
<tr>
<td>Special Provisions:</td>
<td>None</td>
</tr>
<tr>
<td>Explosive Limit &amp; Limited Quantity Index:</td>
<td>0.125 l</td>
</tr>
<tr>
<td>ERAP Index:</td>
<td>None</td>
</tr>
<tr>
<td>Passenger Carrying Ship Index:</td>
<td>None</td>
</tr>
<tr>
<td>Passenger Carrying Road or Rail Vehicle Index:</td>
<td>75</td>
</tr>
</tbody>
</table>

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (IATA): This gas is classified as dangerous goods, per the International Air Transport Association.

<table>
<thead>
<tr>
<th>UN Identification Number:</th>
<th>UN 1009</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proper Shipping Name/Description:</td>
<td>Bromotrifluoromethane (Refrigerant gas R 13B1)</td>
</tr>
<tr>
<td>Hazard Class or Division:</td>
<td>2.2 (Non-Flammable Gas)</td>
</tr>
</tbody>
</table>
The following shipping classification applies when the product is supplied in types of cylinders other than fire extinguishers:

INTERNATIONAL AIR TRANSPORT ASSOCIATION SHIPPING INFORMATION (continued):

Hazard Label(s) Required: Class 2.2 (Non-Flammable Gas)
Packing Group: None
Excepted Quantities: E1
Passenger and Cargo Aircraft Packing Instruction: 200
Passenger and Cargo Aircraft Maximum Net Quantity per Pkg.: 75 kg
Passenger and Cargo Aircraft Limited Quantity Packing Instruction: Forbidden
Passenger and Cargo Aircraft Limited Quantity Maximum Net Quantity per Pkg.: Forbidden
Cargo Aircraft Only Packing Instruction: 200
Cargo Aircraft Only Maximum Net Quantity per Pkg.: 150 kg
Special Provisions: None
ERG Code: 2L

INTERNATIONAL MARITIME ORGANIZATION SHIPPING INFORMATION (IMO): This gas is classified as dangerous goods, per the International Maritime Organization.

UN No.: 1009
Proper Shipping Name: Bromotrifluoromethane (Refrigerant gas R 13B1)
Hazard Class Number: 2.2
Packing Group: None
Special Provisions: None
Limited Quantities: 120 mL
Excepted Quantities: E1
Packing: Instructions: P200; Provisions: None
IBC's: Instructions: None; Provisions: None
 Tanks: Instructions: T50; Provisions: None
EmS: F-C, S-V
Stowage Category: Category A.
 Marine Pollutant: This gas does not meet the criteria of a Marine Pollutant.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR): This gas is classified by the Economic Commission for Europe to be dangerous goods.

UN No.: 1009
Name and Description: Bromotrifluoromethane (Refrigerant gas R 13B1)
Class: 2
Classification Code: 2A
Packing Group: None
Labels: 2.2
Special Provisions: None
Limited Quantities: 120 mL
Excepted Quantities: E1
Packing Instructions: P200
Special Packing Instructions: None
Mixed Packing Provisions: MP9
Portable Tank and Bulk Container: Instructions: (M) T50; Special Provisions: None
HAZARD IDENTIFICATION No.: None

TRANSPORT IN BULK ACCORDING TO THE IBC CODE: See the information under the individual jurisdiction listings for IBC information.

ENVIRONMENTAL HAZARDS: This gas does not meet the criteria of environmentally hazardous according to the criteria of the UN Model Regulations (as reflected in the IMDG Code, ADR, RID, and ADN); this gas is not specifically listed in Annex III under MARPOL 79/78.

U.S. FEDERAL REGULATIONS:

EPA - ENVIRONMENTAL PROTECTION AGENCY:
Reportable Quantity (RQ): Not Applicable
SARA TITLE III: Superfund Amendment and Reauthorization Act
Sections 302/304: Emergency Planning and Notification (40 CFR Part 355)
Extremely Hazardous Substances: Halon 1301 is not listed.
Threshold Planning Quantity (TPQ): Not Applicable
Reportable Quantity (RQ): Not Applicable
Sections 311/312: Hazardous Chemical Reporting (40 CFR Part 370)
IMMEDIATE HEALTH: No PRESSURE: Yes DELAYED HEALTH: No REACTIVITY: No FIRE: No
Section 313: Toxic Chemical Release Reporting (40 CFR 372)
Releases of Halon 1301 require reporting under Section 313.

SECTION 15. REGULATORY INFORMATION
U.S. FEDERAL REGULATIONS (continued):

CLEAN AIR ACT:
  Section 112 (r): Risk Management Programs for Chemical Accidental Release (40 CFR Part 68)
  Threshold Planning Quantity (TPQ): Not Applicable

TSCA: Toxic Substances Control Act
  Halon 1301 is listed in the TSCA Inventory

OSHA - Occupational Safety and Health Administration:
  Threshold Planning Quantity (TPQ): Not Applicable

Other U.S. Federal Regulations:
  Requirements under (40 CFR Part 82) may be applicable as Halon 1301 is designated as an ozone-depleting compound.

U.S. State Regulatory Information:
  California Proposition 65: Halon 1301 is NOT listed on the California Proposition 65 lists.

CANADIAN FEDERAL REGULATIONS:

CANADIAN FEDERAL REGULATIONS:

Canadian DSL Inventory Status: Halon 1211 is listed on the DSL Inventory.
Other Canadian Regulations: Halon 1301 is not on the CEPA Priorities Substances Lists.
Canadian WHMIS Classification and Symbols: Halon 1211 is categorized as a Controlled Product, Hazard Class A, as per the Controlled Product Regulations. Class A: Compressed Gas

EUROPEAN REGULATIONS:

Safety, Health, and Environmental Regulations/Legislation Specific for the Product: Currently, there is no specific legislation pertaining to this product.

GLOBAL HARMONIZATION AND EU CLP REGULATION (EC) 1272/2008 LABELING AND CLASSIFICATION:

Classified in accordance with CLP Regulation (EC) 1272/2008.
Classification: Gas under Pressure/Liquefied Gas
Signal Word: Warning
Hazard Statement: H280: Contains gas under pressure; may explode if heated.
Prevention Statements:
  Precautionary: None.
  Response: None
Storage: P410 + P403: Protect from sunlight. Store in a well-ventilated place.
Disposal: P501: Dispose of contents/containers in accordance with all local, regional, national and international regulations.
Hazard Symbol: GHS04

DEFINITIONS OF TERMS

EXPOSURE LIMITS IN AIR:

CEILING LEVEL: The concentration that shall not be exceeded during any part of the working exposure.

DFG MAK Germ Cell Mutagen Categories:
  1: Germ cell mutations which have been shown to increase the mutation frequency in the progeny of exposed mammals. 2: Germ cell mutations which have been shown to increase the mutation frequency in the progeny of exposed mammals. 3A: Substances which have been shown to induce genetic damage in germ cells of human cells of animals, or which produce mutagenic effects in somatic cells of mammals in vivo and have been shown to reach the germ cells in an active form. 3B: Substances which are suspected of being germ cell mutagens because of their genotoxic effects in mammalian somatic cell in vivo; in exceptional cases, substances for which there are no in vivo data, but which are clearly mutagenic in vitro and structurally related to known in vivo mutagens. 4: Not applicable (Category 4 carcinogenic substances are those with non-genotoxic mechanisms of action.

EXPOSURE LIMITS IN AIR (continued):

DFG MAK Germ Cell Mutagen Categories (continued): 4 (continued): By definition, germ cell mutagens are genotoxic. Therefore, a Category 4 for germ cell mutagens cannot apply. At some time in the future, it is conceivable that a Category 4 could be established for genotoxic substances with primary targets other than DNA [e.g. purely aneugenic substances] if research results make this seem sensible.] 5: Germ cell mutagens, the potency of which is considered to be so low that, provided the MAK value is observed, their contribution to genetic risk for humans is expected not to be significant.

DFG MAK Pregnancy Risk Group Classification:
  Group A: A risk of damage to the developing embryo or fetus has been unequivocally demonstrated. Exposure of pregnant women can lead to damage of the developing organism, even when MAK and BAT (Biological Tolerance Value for Working Materials) values are observed. Group B: Currently available information indicates a risk of damage to the developing embryo or fetus must be considered to be probable. Damage to the developing organism cannot be excluded when pregnant women are exposed, even when MAK and BAT values are observed.
EXPOSURE LIMITS IN AIR (continued):

DGF MAK Pregnancy Risk Group Classification (continued): Group C: There is no reason to feel that women should change to the developing embryo or fetus when MAK and BAT values are observed. Group D: Classification on not observed. We recommend that the MAK and BAT values, although the data available may indicate a trend, are not sufficient for final evaluation.

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.

LOI: Limit of Quantitation.

MAC: MAK-GLP (German Limit Values). The MAK-GLP is the maximum concentration of air pollutants that are allowed at the workplace. The MAK-GLP is derived from the MAK value, which is the limit below which no adverse effects will be observed. The MAK-GLP is based on the MAK value and takes into account the specific circumstances of the workplace. The MAK-GLP is used to protect the health of workers and to ensure a safe working environment.

NE: Not Established. When no exposure guidelines are established, an entry of NE is made for reference.

NIOSH: National Institute for Occupational Safety and Health.

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.

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-Weighted Average: Time Weighted Average exposure concentration for a workshift up to a 40-hr workweek, with the exception of almost all irritant materials that may burn rapidly and create flash fire hazards (e.g. cotton, sisal, hemp; Solids and Semisolids whose LD50 acute inhalation LC50 acute dermal toxicity is greater than 10 mg/kg but less than or equal to 200 mg/kg. Materials whose LD50 for acute oral toxicity is greater than 500 mg/kg but less than or equal to 2000 mg/kg. Materials that cause slight to moderate irritation to the respiratory tract, skin and eyes. 2 (materials that, under emergency conditions, can cause temporary incapacitation or residual injury): Gases and vapors whose LD50 for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 5 mg/L. Materials whose LD50 for acute dermal toxicity is greater than 100 mg/kg but less than or equal to 1000 mg/kg. Materials whose LD50 for acute oral toxicity is greater than 50 mg/kg but less than or equal to 100 mg/kg. Materials whose LC50 for acute inhalation toxicity is greater than 2 mg/L but less than or equal to 5 mg/L.

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM HAZARD RATINGS (continued):

FLAMMABILITY HAZARD (continued): 4 (Severe Hazard-Materials that will rapidly or continuously ignite or burn at or below room temperature and will not be extinguished by means of water or other extinguishing agents, or by which self-contained oxygen (e.g. dry nitricelulose and many organic peroxides);...
NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

HEALTH HAZARD (continued): 3 (continued): Materials whose LD₅₀ for acute oral toxicity is greater than 5 mg/kg but less than or equal to 50 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity, if its LC₅₀ is less than or equal to 3000 ppm and that does not meet the criteria for degree of hazard 4. Compressed liquefied gases with boiling points between -30°C (-22°F) and -55°C (-66.5°F) that cause frostbite and irreversible tissue damage. Materials that are respiratory irritants. Cryogenic gases that cause frostbite and irreversible tissue damage. Materials that are corrosive to the respiratory tract. Materials that are corrosive to the eyes or cause irreversible corneal opacity. Materials that are corrosive to the skin. 4 (materials that, under emergency conditions, can be lethal): Gases and vapors whose LC₅₀ for acute inhalation toxicity less than or equal to 1.000 ppm. Dusts and mists whose LC₅₀ for acute inhalation toxicity is less than or equal to 0.5 mg/kg. Materials whose LD₅₀ for acute dermal toxicity is less than or equal to 40 mg/kg. Materials whose LC₅₀ for acute oral toxicity is less than or equal to 5 mg/kg. Any liquid whose saturated vapor concentration at 20°C (68°F) is equal to or greater than one-fifth its LC₅₀ for acute inhalation toxicity. If its LC₅₀ is less than or equal to 1000 ppm and vapors whose LC₅₀ is greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

FLAMMABILITY HAZARD: 0 Materials that will not burn under typical fire conditions, including intrinsically noncombustible materials such as concrete, stone, and sand. Materials that will not burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. 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. Materials that will burn in air when exposed to a temperature of 816°C (1500°F) for a period of 5 minutes in accordance with Annex D. Liquids, solids and semisolids having a flash point at or above 93.4°C (200°F) (i.e. Class III B liquids). Liquids with a flash point greater than 35°C (95°F) that do not sustain combustion when tested using the Method of Testing for Sustained Combustibility, per 49 CFR 173, Appendix H or the UN Recommendations on the Transport of Dangerous Goods, Model Regulations (current edition) and the related Manual of Tests and Criteria (current edition). Liquids with a flash point greater than 35°C (95°F) in a water-miscible solution or dispersion with a water non-combustible liquid/solid content of more than 85 percent by weight. Liquids that have no fire point when tested by ASTM D 92 Standard Test Method for Flash and Fire Points by Cleveland Open Cup, up to a boiling point of the liquid or up to a temperature at which the sample being tested shows an obvious physical change. Combustible pellets with a representative diameter of greater than 2 mm (10 mesh). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated. Materials that are respiratory irritants. Cryogenic gases that cause frostbite and irreversible tissue damage. 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: Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIIA liquids.) Solid materials in the form of powders or granules of dust or smoke containing less than 1000 ppm (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures in air. Solid materials in fibrous or shredded form that burn rapidly and create flash fire hazards, such as cotton, sash and hemp. Solids and semisolids that readily give off flammable vapors. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. 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: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (73°F) and below 37.8°C (73°F) (i.e. Class III B and IIIC liquids). Materials that, on account of their physical form or environmental conditions, can form explosive mixtures with air and are readily dispersed in air. Flammable or combustible dusts with a representative diameter smaller than 0.1 micrometer (40 mesh) and 2 mm (10 mesh) that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. 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: 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 a boiling point below 37.8°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.

NATIONAL FIRE PROTECTION ASSOCIATION HAZARD RATINGS (continued):

INSTABILITY HAZARD: 0 Materials that in themselves are normally stable, but when under certain fire conditions, may become unstable at elevated temperatures and pressures. Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) below 0.01 W/mL. Materials that do not exhibit an exotherm at temperatures less than or equal to 500°C (932°F) when tested by differential scanning calorimetry. 1 Materials that in themselves are normally stable, but when exposed to certain fire conditions, may become unstable at elevated temperatures and pressures. Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) or above 0.01 W/mL and below 10 W/mL. 2 Materials that readily undergo violent chemical change at elevated temperatures and pressures: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 10 W/mL and below 100 W/mL. Materials that are sensitive to thermal or mechanical shock at elevated temperatures and pressures. 4 Materials that in themselves are readily 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: Materials that have an estimated instantaneous power density (product of heat of reaction and reaction rate) at 250°C (482°F) at or above 100 W/mL and below 1000 W/mL. Materials that are sensitive to thermal or mechanical shock 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. Explosive Concentration Limits (percent of vapor in air, by volume, that will explode in the presence of an ignition source). Combustibility: Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated. Materials that are respiratory irritants. Cryogenic gases that cause frostbite and irreversible tissue damage. 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: Liquids having a flash point at or above 37.8°C (100°F) and below 93.4°C (200°F) (i.e. Class II and Class IIIA liquids.) Solid materials in the form of powders or granules of dust or smoke containing less than 1000 ppm (40 mesh) and 2 mm (10 mesh) that burn rapidly but that generally do not form explosive mixtures in air. Solid materials in fibrous or shredded form that burn rapidly and create flash fire hazards, such as cotton, sash and hemp. Solids and semisolids that readily give off flammable vapors. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. 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: Liquids having a flash point below 22.8°C (73°F) and having a boiling point at or above 37.8°C (100°F) and those liquids having a flash point at or above 22.8°C (73°F) and below 37.8°C (73°F) and below 37.8°C (73°F) (i.e. Class III B and IIIC liquids). Materials that, on account of their physical form or environmental conditions, can form explosive mixtures with air and are readily dispersed in air. Flammable or combustible dusts with a representative diameter smaller than 0.1 micrometer (40 mesh) and 2 mm (10 mesh) that burn with extreme rapidity, usually by reason of self-contained oxygen (e.g. dry nitrocellulose and many organic peroxides). Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent. 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: 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 a boiling point below 37.8°C (100°F) (i.e. Class IA liquids). Materials that ignite when exposed to air. Solids containing greater than 0.5 percent by weight of a flammable or combustible solvent are rated by the closed cup flash point of the solvent.