1,1,2-Trichloro-1,2,2-trifluoroethane

sc-251541

Material Safety Data Sheet

Hazard Alert Code Key:	EXTREME	HIGH	MODERATE	LOW

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME

1,1,2-Trichloro-1,2,2-trifluoroethane

STATEMENT OF HAZARDOUS NATURE

CONSIDERED A HAZARDOUS SUBSTANCE ACCORDING TO OSHA 29 CFR 1910.1200.

NFPA

SUPPLIER

Company: Santa Cruz Biotechnology, Inc.

Address:

2145 Delaware Ave
Santa Cruz, CA 95060

Telephone: 800.457.3801 or 831.457.3800

Emergency Tel: **CHEMWATCH: From within the US and Canada: 877-715-9305**

Emergency Tel: **From outside the US and Canada: +800 2436 2255 (1-800-CHEMCALL) or call +613 9573 3112**

PRODUCT USE

Used for cleaning, degreasing electrical equipment; a dry-cleaning solvent; in manufacture of chlorotrifluoroethylene; in liquid fire extinguishers, as a urethane foam blowing agent, refrigerant. Ozone depletion potential 1.0/1.0 Severe. The Montreal Protocol on Substances that Deplete the Ozone Layer has caused a substantial decline in its use.

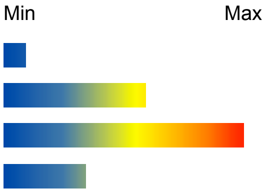
SYNONYMS

C2-Cl3-F3, ClF2C-CCl2F, CFC-113, CFC113, trichlorotrifluoroethane, "1, 1, 2-trichlorotrifluoroethane", "1, 2, 2-trichlorotrifluoroethane", "1, 1, 2-trichloro-1, 2, 2-trifluoroethane", "1, 1, 2-trifluorotrichloroethane", "1, 1, 2-trifluoro-1, 2, 2-trichloroethane", Arcton-63, Arklone-P, Asahifron-113, Daiflon-S3, F-113, FC-113, Fluorocarbon-113, Forane, Freon-113, Frigen-113A, Frigen-113-TR, Frigen-113-TR-N, Frigen-113-TR-T, Genetron-113, Halocarbon-113, Isceon-113, "Kaiser Chemicals-11", Khladon-113, Ledon-113, R-113, "Refrigerant R-113", "R-113 (Halocarbon)", Ucon-113, "Ucon Fluorocarbon-113", "Ucon 113/Halocarbon-113"

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

Flammability:	0
Toxicity:	2
Body Contact:	4
Reactivity:	1



Min/Nil=0
Low=1
Moderate=2
High=3
Extreme=4

Chronic: 2

CANADIAN WHMIS SYMBOLS

EMERGENCY OVERVIEW

RISK

Forms very sensitive explosive metallic compounds.
Causes severe burns.
Risk of serious damage to eyes.
Dangerous for the ozone layer.
Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

- The material can produce severe chemical burns within the oral cavity and gastrointestinal tract following ingestion.
- Although ingestion is not thought to produce harmful effects, the material may still be damaging to the health of the individual following ingestion, especially where pre-existing organ (e.g. liver, kidney) damage is evident. Present definitions of harmful or toxic substances are generally based on doses producing mortality (death) rather than those producing morbidity (disease, ill-health). Gastrointestinal tract discomfort may produce nausea and vomiting. In an occupational setting however, ingestion of insignificant quantities is not thought to be cause for concern.
- It was necessary to give multiple doses of 1,1,2-trichlorotrifluoroethane to determine an LD50 value. Pulmonary haemorrhage and mottled livers were noted in rats that died.

EYE

- The material can produce severe chemical burns to the eye following direct contact. Vapors or mists may be extremely irritating.
- If applied to the eyes, this material causes severe eye damage.

SKIN

- The material can produce severe chemical burns following direct contactwith the skin.
- Skin contact is not thought to have harmful health effects, however the material may still produce health damage following entry through wounds, lesions or abrasions.
- Fluorocarbons remove natural oils from the skin, causing irritation,dryness and sensitivity.
- Open cuts, abraded or irritated skin should not be exposed to this material.
- Entry into the blood-stream, through, for example, cuts, abrasions or lesions, may produce systemic injury with harmful effects. Examine the skin prior to the use of the material and ensure that any external damage is suitably protected.
- There is some evidence to suggest that the material may cause mild but significant inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterized by redness, swelling and blistering.

INHALED

- If inhaled, this material can irritate the throat andlungs of some persons.
- Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by narcosis, reduced alertness, loss of reflexes, lack of coordination and vertigo.
- Inhalation of vapors or aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.
- Although 1,1,2-trichlorotrifluoroethane acts as a weak narcotic it has a relatively potent cardiac sensitisation potential compared to homologous fluorocarbons.

Other effects seen after massive exposures include irritation of the respiratory tract and hepatocyte enlargement. Transient lethargy was the only clinical sign seen in rats that inhaled 12000 pp.. Dogs experienced vomiting, lethargy, nervousness and tremors, all reversible within 15 minutes after cessation of exposure. Humans exposed to about 2500 ppm lose the ability to concentrate and exhibit mild lethargy.

- Acute intoxication by halogenated aliphatic hydrocarbons appears to take place over two stages. Signs of a reversible narcosis are evident in the first stage and in the second stage signs of injury to organs may become evident, a single organ alone is (almost) never involved.
- Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. Vapor is heavier than air and may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure.
- Depression of the central nervous system is the most outstanding effect of most halogenated aliphatic hydrocarbons. Inebriation and excitation, passing into narcosis, is a typical reaction. In severe acute exposures there is always a danger of death from respiratory failure or cardiac arrest due to a tendency to make the heart more susceptible to catecholamines (adrenalin).
- Exposure to fluorocarbons can produce non-specific flu-like symptoms such as chills, fever, weakness, muscle pain, headache, chest discomfort, sore throat and dry cough with rapid recovery. High concentrations can cause irregular heartbeats and a stepwise reduction in lung capacity. Heart rate may be reduced.

CHRONIC HEALTH EFFECTS

- Repeated or prolonged exposure to corrosives may result in the erosion of teeth, inflammatory and ulcerative changes in the mouth and necrosis (rarely) of the jaw. Bronchial irritation, with cough, and frequent attacks of bronchial pneumonia may ensue. Gastrointestinal disturbances may also occur. Chronic exposures may result in dermatitis and/or conjunctivitis.

Limited evidence suggests that repeated or long-term occupational exposure may produce cumulative health effects involving organs or biochemical systems.

1,1,2-Trichlorotrifluoroethane showed no effect after 20 weeks of application to uncovered skin. By contrast trichloroethylene produced erythema and ulcerations at the end of the first week. Occluded contact of 5 gm/kg of the fluorocarbon produced local necrosis and sloughing plus conspicuous hepatomegaly (enlarged liver).

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
1,1,2-trichlorotrifluoroethane	76-13-1	> 99

Section 4 - FIRST AID MEASURES

SWALLOWED

■

- For advice, contact a Poisons Information Center or a doctor at once.
- Urgent hospital treatment is likely to be needed.
- If swallowed do NOT induce vomiting.
- If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.
- Observe the patient carefully.
- Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious.
- Give water to rinse out mouth, then provide liquid slowly and as much as casualty can comfortably drink.
- Transport to hospital or doctor without delay.
- Avoid giving milk or oils.
- Avoid giving alcohol.

EYE

■ If this product comes in contact with the eyes:

- Immediately hold eyelids apart and flush the eye continuously with running water.
- Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
- Continue flushing until advised to stop by the Poisons Information Center or a doctor, or for at least 15 minutes.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

■ If skin or hair contact occurs:

- Immediately flush body and clothes with large amounts of water, using safety shower if available.
- Quickly remove all contaminated clothing, including footwear.
- Wash skin and hair with running water. Continue flushing with water until advised to stop by the Poisons Information Center.
- Transport to hospital, or doctor.

INHALED

■

- If fumes or combustion products are inhaled remove from contaminated area.
- Lay patient down. Keep warm and rested.
- Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
- Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.
- Transport to hospital, or doctor.

NOTES TO PHYSICIAN

■ for intoxication due to Freons/ Halons;

A: Emergency and Supportive Measures

- Maintain an open airway and assist ventilation if necessary
- Treat coma and arrhythmias if they occur. Avoid (adrenaline) epinephrine or other sympathomimetic amines that may precipitate ventricular arrhythmias. Tachyarrhythmias caused by increased myocardial sensitization may be treated with propranolol, 1-2 mg IV or esmolol 25-100 microgm/kg/min IV.
- Monitor the ECG for 4-6 hours

B: Specific drugs and antidotes:

- There is no specific antidote

C: Decontamination

- Inhalation; remove victim from exposure, and give supplemental oxygen if available.
- Ingestion; (a) Prehospital: Administer activated charcoal, if available. DO NOT induce vomiting because of rapid absorption and the risk of abrupt onset CNS depression. (b) Hospital: Administer activated charcoal, although the efficacy of charcoal is unknown. Perform gastric lavage only if the ingestion was very large and recent (less than 30 minutes)

D: Enhanced elimination:

- There is no documented efficacy for diuresis, hemodialysis, hemoperfusion, or repeat-dose charcoal

POISONING and DRUG OVERDOSE, Californian Poison Control System Ed. Kent R Olson; 3rd Edition.

For frost-bite caused by liquefied petroleum gas:

- If part has not thawed, place in warm water bath (41-46 C) for 15-20 minutes, until the skin turns pink or red.

- Analgesia may be necessary while thawing.
- If there has been a massive exposure, the general body temperature must be depressed, and the patient must be immediately rewarmed by whole-body immersion, in a bath at the above temperature.
- Shock may occur during rewarming.
- Administer tetanus toxoid booster after hospitalization.
- Prophylactic antibiotics may be useful
- The patient may require anticoagulants and oxygen.

[Shell Australia 22/12/87].

Section 5 - FIRE FIGHTING MEASURES

Vapor Pressure (mmHg):	333.777 @ 25 C
Upper Explosive Limit (%):	Not Available
Specific Gravity (water=1):	1.57 @ 25 C
Lower Explosive Limit (%):	Not Available

EXTINGUISHING MEDIA

■

- Foam.
- Dry chemical powder.
- BCF (where regulations permit).
- Carbon dioxide.
- Water spray or fog - Large fires only.

FIRE FIGHTING

■

- Alert Emergency Responders and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves for fire only.
- Prevent, by any means available, spillage from entering drains or water course.
- Use fire fighting procedures suitable for surrounding area.
- Do not approach containers suspected to be hot.
- Cool fire exposed containers with water spray from a protected location.
- If safe to do so, remove containers from path of fire.
- Equipment should be thoroughly decontaminated after use.

GENERAL FIRE HAZARDS/HAZARDOUS COMBUSTIBLE PRODUCTS

■

- Non combustible.
- Not considered to be a significant fire risk.
- Heating may cause expansion or decomposition leading to violent rupture of containers.
- May emit corrosive, poisonous fumes.

Decomposes on heating and produces acrid and toxic fumes of: carbon dioxide (CO_2), hydrogen chloride, phosgene, hydrogen fluoride, other pyrolysis products typical of burning organic material.

Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.

FIRE INCOMPATIBILITY

■ Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids,chlorine bleaches, pool chlorine etc. as ignition may result.

PERSONAL PROTECTION

Glasses:
Full face- shield.
Gloves:
1.PE/EVAL/PE 2.TEFLON 3.PVA
Respirator:
Type AX Filter of sufficient capacity

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

■ Environmental hazard - contain spillage.

- Clean up all spills immediately.
- Avoid breathing vapors and contact with skin and eyes.
- Control personal contact by using protective equipment.
- Contain and absorb spill with sand, earth, inert material or vermiculite.
- Wipe up.
- Place in a suitable labeled container for waste disposal.

MAJOR SPILLS

■ Environmental hazard - contain spillage.

- Clear area of personnel and move upwind.

- Alert Emergency Responders and tell them location and nature of hazard.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- Stop leak if safe to do so.
- Contain spill with sand, earth or vermiculite.
- Collect recoverable product into labeled containers for recycling.
- Neutralize/decontaminate residue.
- Collect solid residues and seal in labeled drums for disposal.
- Wash area and prevent runoff into drains.
- After clean up operations, decontaminate and launder all protective clothing and equipment before storing and re-using.
- If contamination of drains or waterways occurs, advise emergency services.

Chemical Class: aliphatics, halogenated

For release onto land: recommended sorbents listed in order of priority.

SORBENT TYPE	RANK	APPLICATION	COLLECTION	LIMITATIONS
LAND SPILL - SMALL				
cross-linked polymer - particulate	1	shovel	shovel	R, W, SS
cross-linked polymer - pillow	1	throw	pitchfork	R, DGC, RT
wood fiber - pillow	2	throw	pitchfork	R, P, DGC, RT
treated wood fibre - particulate	2	shovel	shovel	R, W, DGC
sorbent clay - particulate	3	shovel	shovel	R, I, P
foamed glass - pillow	3	throw	pitchfork	R, P, DGC, RT
LAND SPILL - MEDIUM				
cross-linked polymer - particulate	1	blower	skiploader	R,W, SS
cross-linked polymer - pillow	2	throw	skiploader	R, DGC, RT
sorbent clay - particulate	3	blower	skiploader	R, I, P
polypropylene - particulate	3	blower	skiploader	W, SS, DGC
foamed glass - pillow	3	throw	skiploader	R, P, DGC, RT
expanded mineral - particulate	4	blower	skiploader	R, I, W, P, DGC

Legend

DGC: Not effective where ground cover is dense

R; Not reusable

I: Not incinerable

P: Effectiveness reduced when rainy

RT:Not effective where terrain is rugged

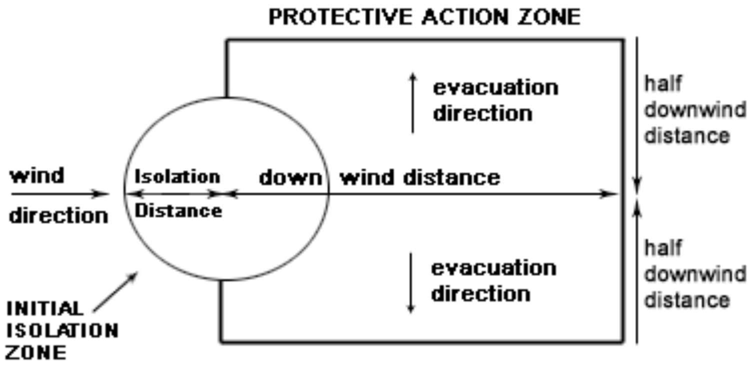
SS: Not for use within environmentally sensitive sites

W: Effectiveness reduced when windy

Reference: Sorbents for Liquid Hazardous Substance Cleanup and Control;

R.W Melvold et al: Pollution Technology Review No. 150: Noyes Data Corporation 1988.

PROTECTIVE ACTIONS FOR SPILL



From IERG (Canada/Australia)	
Isolation Distance	-
Downwind Protection Distance	10 meters

From US Emergency Response Guide 2000 Guide 171

FOOTNOTES

1 PROTECTIVE ACTION ZONE is defined as the area in which people are at risk of harmful exposure. This zone assumes that random changes in wind direction confines the vapour plume to an area within 30 degrees on either side of the predominant wind direction, resulting in a crosswind protective action distance equal to the downwind protective action distance.

2 PROTECTIVE ACTIONS should be initiated to the extent possible, beginning with those closest to the spill and working away from the site in the downwind direction. Within

the protective action zone a level of vapour concentration may exist resulting in nearly all unprotected persons becoming incapacitated and unable to take protective action and/or incurring serious or irreversible health effects.
3 INITIAL ISOLATION ZONE is determined as an area, including upwind of the incident, within which a high probability of localised wind reversal may expose nearly all persons without appropriate protection to life-threatening concentrations of the material.
4 SMALL SPILLS involve a leaking package of 200 litres (55 US gallons) or less, such as a drum (jerrican or box with inner containers). Larger packages leaking less than 200 litres and compressed gas leaking from a small cylinder are also considered "small spills". LARGE SPILLS involve many small leaking packages or a leaking package of greater than 200 litres, such as a cargo tank, portable tank or a "one-tonne" compressed gas cylinder.
5 Guide 171 is taken from the US DOT emergency response guide book.
6 IERG information is derived from CANUTEC - Transport Canada.

ACUTE EXPOSURE GUIDELINE LEVELS (AEGL) (in ppm)

AEGL 1: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.
AEGL 2: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
AEGL 3: The airborne concentration of a substance above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING

■ Contains low boiling substance:
Storage in sealed containers may result in pressure buildup causing violent rupture of containers not rated appropriately.

- Check for bulging containers.
- Vent periodically
- Always release caps or seals slowly to ensure slow dissipation of vapors
- DO NOT allow clothing wet with material to stay in contact with skin
- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Avoid contact with moisture.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- Keep containers securely sealed when not in use.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately. Launder contaminated clothing before re-use.
- Use good occupational work practice.
- Observe manufacturer's storing and handling recommendations.
- Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

RECOMMENDED STORAGE METHODS

■ DO NOT use aluminum or galvanized containers.

- Polyethylene or polypropylene container.
- Packing as recommended by manufacturer
- Check all containers are clearly labeled and free from leaks.

STORAGE REQUIREMENTS

■

- Store in original containers.
- Keep containers securely sealed.
- Store in a cool, dry, well-ventilated area.
- Store away from incompatible materials and foodstuff containers.
- Protect containers against physical damage and check regularly for leaks.
- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

X: Must not be stored together
O: May be stored together with specific preventions
+: May be stored together

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m^3	STEL ppm	STEL mg/m^3	Peak ppm	Notes
Canada - Alberta Occupational Exposure Limits	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2trifluoroethane)	1000	7660	1250	9580		
Canada - British Columbia Occupational Exposure Limits	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	500		1250			
Canada - Ontario Occupational Exposure Limits	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1,000	7,650	1,250	9,560		
US ACGIH Threshold Limit Values (TLV)	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane [FC-113])	1000		1250			TLV Basis: central nervous system impairment
US NIOSH Recommended Exposure Limits (RELs)	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1000	7600	1250	9500		
US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1000	7600	1250	9500		
US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2, 2-trifluoroethane)	1000	7600				
US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2, 2-trifluoroethane)	1000	7600	1250	9500		
US - Minnesota Permissible Exposure Limits (PELs)	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1000	7600	1250	9500		
US - California Permissible Exposure Limits for Chemical Contaminants	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1000	7600	1250	9500	2000	
US - Idaho - Limits for Air Contaminants	1,1,2-trichlorotrifluoroethane (1, 1, 2-Trichloro 1, 2, 2-trifluoroethane)	1000	7600				
US OSHA Permissible Exposure Levels (PELs) - Table Z1	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1000	7600				
US - Hawaii Air Contaminant Limits	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1,000	7,600	1,250	9,500		

US - Alaska Limits for Air Contaminants	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1000	7600	1250	9500		
US - Michigan Exposure Limits for Air Contaminants	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1000	7600	1250	9500		
Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro 1,2,2-trifluoroethane)	1,000	7,600	1,250	9,500		
US - Washington Permissible exposure limits of air contaminants	1,1,2-trichlorotrifluoroethane (1, 1, 2-Trichloro-1, 2, 2-trifluoroethane)	1,000		1,250			
Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1000		1250			
Canada - Prince Edward Island Occupational Exposure Limits	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane [FC-113])	1000		1250			TLV Basis: central nervous system impairment
US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2, 2-trifluoroethane)	1000	7600				
Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1000	7670	1250	9590		
US - Oregon Permissible Exposure Limits (Z-1)	1,1,2-trichlorotrifluoroethane (1, 1, 2-Trichloro 1, 2, 2-trifluoro-ethane)	1,000	7,600				
Canada - Northwest Territories Occupational Exposure Limits (English)	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane)	1000	7664	1250	9580		
Canada - Nova Scotia Occupational Exposure Limits	1,1,2-trichlorotrifluoroethane (1,1,2-Trichloro-1,2,2-trifluoroethane [FC-113])	1000		1250			TLV Basis: central nervous system impairment
US TSCA New Chemical Exposure Limits (NCEL)	1,1,2-trichlorotrifluoroethane (Halogenated alkanes (P84-106/107))	1.0					

ENDOELTABLE

MATERIAL DATA

1,1,2-TRICHLOROTRIFLUOROETHANE:

- For 1,1,2-trichlorotrifluoroethane

Odour threshold: 45 ppm

This fluorocarbon causes narcosis and asphyxia at extremely high concentrations and has the potential to induce cardiac arrhythmia. OSHA concluded that the recommended TLV-TWA and STEL substantially reduced these risks and in addition reduced the risk of impaired psychomotor function.

Odour Safety Factor(OSF)

OSF=22 ("1,1,2-TRICHLORO-1,2,2-TRIFLUOROETHANE").

PERSONAL PROTECTION

Consult your EHS staff for recommendations

EYE

■

- Chemical goggles.
- Full face shield.
- Contact lenses pose a special hazard; soft contact lenses may absorb irritants and all lenses concentrate them.

HANDS/FEET

■ Elbow length PVC gloves.

- When handling corrosive liquids, wear trousers or overalls outside of boots, to avoid spills entering boots.

Suitability and durability of glove type is dependent on usage. Important factors in the selection of gloves include: such as:

- frequency and duration of contact,
- chemical resistance of glove material,
- glove thickness and
- dexterity

Select gloves tested to a relevant standard (e.g. Europe EN 374, US F739).

- When prolonged or frequently repeated contact may occur, a glove with a protection class of 5 or higher (breakthrough time greater than 240 minutes according to EN 374) is recommended.
- When only brief contact is expected, a glove with a protection class of 3 or higher (breakthrough time greater than 60 minutes according to EN 374) is recommended.
- Contaminated gloves should be replaced.

Gloves must only be worn on clean hands. After using gloves, hands should be washed and dried thoroughly. Application of a non-perfumed moisturiser is recommended.

OTHER

■

- Overalls.
- P.V.C. apron.
- Barrier cream.
- Skin cleansing cream.
- Eye wash unit.

GLOVE SELECTION INDEX

■ Glove selection is based on a modified presentation of the:

"Forsberg Clothing Performance Index".

The effect(s) of the following substance(s) are taken into account in the computer-generated selection: 1,1,2-trichlorotrifluoroethane

■ Protective Material CPI *.

PE/EVAL/PE	A
TEFLON	A
NITRILE	A
PVA	B
NEOPRENE/NATURAL	C
NEOPRENE	C
PE	C
NAT+NEOPR+NITRILE	C
NATURAL+NEOPRENE	C

■ * CPI - Chemwatch Performance Index

A: Best Selection

B: Satisfactory; may degrade after 4 hours continuous immersion

C: Poor to Dangerous Choice for other than short term immersion

NOTE: As a series of factors will influence the actual performance of the glove, a final selection must be based on detailed observation. -

* Where the glove is to be used on a short term, casual or infrequent basis, factors such as "feel" or convenience (e.g. disposability), may dictate a choice of gloves which might otherwise be unsuitable following long-term or frequent use. A qualified practitioner should be consulted.

RESPIRATOR

■ Selection of the Class and Type of respirator will depend upon the level of breathing zone contaminant and the chemical nature of the contaminant. Protection Factors (defined as the ratio of contaminant outside and inside the mask) may also be important.

Breathing Zone Level ppm (volume)	Maximum Protection Factor	Half-face Respirator	Full-Face Respirator
1000	10	AX-1	-
1000	50	-	AX-1
5000	50	Airline*	-
5000	100	-	AX-2
10000	100	-	AX-3
	100+		Airline* *

* - Continuous Flow ** - Continuous-flow or positive pressure demand.

The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

Use appropriate NIOSH-certified respirator based on informed professional judgement. In conditions where no reasonable estimate of exposure can be made, assume the exposure is in a concentration IDLH and use NIOSH-certified full face pressure demand SCBA with a minimum service life of 30 minutes, or a combination full facepiece pressure demand SAR with auxiliary self-contained air supply. Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used.

ENGINEERING CONTROLS

■ Local exhaust ventilation usually required. If risk of overexposure exists, wear an approved respirator. Correct fit is essential to obtain adequate protection an approved self contained breathing apparatus (SCBA) may be required in some situations. Provide adequate ventilation in warehouse or closed storage area.

Air contaminants generated in the workplace possess varying "escape" velocities which, in turn, determine the "capture velocities" of fresh circulating air required to effectively remove the contaminant.

Type of Contaminant:	Air Speed:
solvent, vapors, degreasing etc., evaporating from tank (in still air).	0.25-0.5 m/s (50-100 f/min.)
aerosols, fumes from pouring operations, intermittent container filling, low speed conveyer transfers, welding, spray drift, plating acid fumes, pickling (released at low velocity into zone of active generation)	0.5-1 m/s (100-200 f/min.)
direct spray, spray painting in shallow booths, drum filling, conveyer loading, crusher dusts, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 f/min.)
grinding, abrasive blasting, tumbling, high speed wheel generated dusts (released at high initial velocity into zone of very high rapid air motion).	2.5-10 m/s (500-2000 f/min.)

Within each range the appropriate value depends on:

Lower end of the range	Upper end of the range
1: Room air currents minimal or favorable to capture	1: Disturbing room air currents
2: Contaminants of low toxicity or of nuisance value only.	2: Contaminants of high toxicity
3: Intermittent, low production.	3: High production, heavy use
4: Large hood or large air mass in motion	4: Small hood-local control only

Simple theory shows that air velocity falls rapidly with distance away from the opening of a simple extraction pipe. Velocity generally decreases with the square of distance from the extraction point (in simple cases). Therefore the air speed at the extraction point should be adjusted, accordingly, after reference to distance from the contaminating source. The air velocity at the extraction fan, for example, should be a minimum of 1-2 m/s (200-400 f/min) for extraction of solvents generated in a tank 2 meters distant from the extraction point. Other mechanical considerations, producing performance deficits within the extraction apparatus, make it essential that theoretical air velocities are multiplied by factors of 10 or more when extraction systems are installed or used.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL PROPERTIES

Liquid.
Does not mix with water.
Sinks in water.

State	Liquid	Molecular Weight	187.37 Pure
Melting Range (°F)	-31	Viscosity	Not Available
Boiling Range (°F)	117.5	Solubility in water (g/L)	Immiscible
Flash Point (°F)	Not Applicable	pH (1% solution)	Not applicable.
Decomposition Temp (°F)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°F)	1256	Vapor Pressure (mmHg)	333.777 @ 25 C
Upper Explosive Limit (%)	Not Available	Specific Gravity (water=1)	1.57 @ 25 C
Lower Explosive Limit (%)	Not Available	Relative Vapor Density (air=1)	2.9
Volatile Component (%vol)	100	Evaporation Rate	0.9 (BuAc=1)

APPEARANCE

Colourless non flammable liquid; slightly soluble in water. Ethereal odour. Soluble in ether, alcohol and benzene.

log Kow 3.16

Material	Value

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

■

- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerization will not occur.

STORAGE INCOMPATIBILITY

■ 1,1,2-Trichlorotrifluoroethane:

- reacts violently with chemically active metals, barium, calcium, lithium, potassium, sodium and powdered aluminium, beryllium, magnesium, potassium-sodium alloy, titanium, zinc
- may decompose on contact with alloys containing more than 20% magnesium or on hot surfaces, with release of hydrogen chloride, hydrogen fluoride, carbon monoxide and smaller amounts of phosgene and carbonyl fluoride
- will not combust at ordinary temperatures but will ignite and burn weakly at autoignition temperature (680 C)
- attacks some forms of plastics, rubber and coatings.
- CFCs may react with strong oxidizing or reducing agents.

Haloalkanes:

- are highly reactive:some of the more lightly substituted lower members are highly flammable; the more highly substituted may be used as fire suppressants, not always with the anticipated results.
- may react with the lighter divalent metals to produce more reactive compounds analogous to Grignard reagents.
- may produce explosive compounds following prolonged contact with metallic or other azides
- may react on contact with potassium or its alloys - although apparently stable on contact with a wide rage of halocarbons, reaction products may be shock-sensitive and may explode with great violence on light impact; severity generally increases with the degree of halocarbon substitution and potassium-sodium alloys give extremely sensitive mixtures .

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- react with metal halides and active metals, eg. sodium (Na), potassium (K), lithium (Li),calcium (Ca), zinc (Zn), powdered aluminium (Al) and aluminium alloys, magnesium (Mg) and magnesium alloys.
- may react with brass and steel.
- may react explosively with strong oxidisers
- may degrade rubber, and plastics such as methacrylate polymers, polyethylene and polystyrene, paint and coatings

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

1,1,2-TRICHLOROTRIFLUOROETHANE

TOXICITY AND IRRITATION

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

TOXICITY	IRRITATION
Oral (rat) LD50: 43000 mg/kg	Skin (rabbit): 500 (open) - Mild
Inhalation (rat) LCLo: 38500 ppm/4h	Skin (rabbit): 500 mg/24h - Mild
Dermal (rabbit) LD50: >11000 mg/kg * * [Manufacturer]	

■ Chlorofluorocarbons may enter the human organism by inhalation, ingestion, or dermal contact. Inhalation is the most common and important route of entry, and exhalation is the most significant route of elimination from the body. Controlled studies with volunteer subjects and experimental animals have provided substantial data from exposures to a number of the chlorofluorocarbons. These data indicate that chlorofluorocarbons:

- can be absorbed across the alveolar membrane, gastro- intestinal tract, or the skin;
- are absorbed rapidly into the blood, following inhalation;
- are absorbed into the blood at a decreasing rate as blood concentration increases;
- once in the blood, are absorbed by various tissues;
- will reach a stable blood level if exposure is sufficiently long, indicating an equilibrium between the air containing the chlorofluorocarbons and the blood;
- are still absorbed by body tissue, after the initial blood level stabilization, and continue to enter the body.

Studies with animals indicate that chlorofluorocarbons are rapidly absorbed after inhalation and are distributed by blood into practically all tissues of the body. The highest concentrations are usually found in fatty or lipid-containing tissues. However, chlorofluorocarbons are also found in organs with a good blood supply, e.g., heart, lung, kidney, muscle. Results from animal and human metabolic studies have demonstrated the resistance of chlorofluorocarbons to breakdown or metabolic transformation in biological systems. These results suggest that chlorofluorocarbons, in general, are metabolised to a very small degree, if at all, following exposure. Regardless of the route of entry, chlorofluorocarbons are eliminated almost exclusively through the respiratory tract via exhaled air. No significant recovery of chloro fluorocarbons or their metabolites has been reported in studies attempting to identify metabolic transformation products via elimination in urine or faeces.

The acute inhalation toxicity of chlorofluorocarbons has been extensively studied. The chlorofluorocarbons generally show low acute inhalation toxicity. The symptomatology of acute intoxication involves CNS effects, secondary effects on the cardiovascular system, and irritation of the respiratory tract. At high concentrations, human subjects experienced a tingling sensation, humming in the ears, and apprehension. EEG changes were noted as well as slurred speech and de- creased performance in psychological tests. An exposure to an 11% (545 g/m3) concentration of CFC-12 for 11 min caused a significant degree of cardiac arrhythmia, followed by a decrease in consciousness with amnesia after 10 min. Significant acute reduction in the ventilatory lung capacity of hairdressers using chlorofluorocarbon-containing hairsprays was observed in several studies. Cases of neurological effects attributed to occupational exposure to chlorofluorocarbons have been reported. Non-occupational exposure and accidental or abusive inhalation of aerosols have also been documented, the main symptoms being CNS depression and cardiovascular reactions. Cardiac arrhythmia, possibly aggravated by elevated levels of catecholamines due to stress or by moderate hypercapnia (a condition where there is too much carbon dioxide (CO_2) in the blood), is suggested as the cause of these adverse responses, which may lead to death.

The limited information available on the acute oral toxicity of chlorofluorocarbons indicates low toxicity. When applied dermally in high doses,CFCs cause various degrees of irritation but no other significant effects. Limited studies indicate that individuals with a prior history of skin reaction to deodorant sprays containing CFC-11 or CFC-12 may become sensitised to dermal applications of certain chlorofluorocarbons.

The available information indicates that the fully halogenated chlorofluorocarbons have little or no mutagenic or carcinogenic potential. Negative results have been obtained in vitro using bacteria and mammalian cells with or without metabolic activation and in the dominant lethal test.

Long-term carcinogenicity studies (by oral and inhalation routes) with CFC-11 and CFC-12 in rats and mice showed negative results. Although a tumourigenic response in the nasal cavity was observed in rats upon inhalation of CFC-113, this response was considered equivocal. The tumours were of various morphologies and the incidences were not dose-related.

Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound. Key criteria for the diagnosis of RADS include the absence of preceding respiratory disease, in a non-atopic individual, with abrupt onset of persistent asthma-like symptoms within minutes to hours of a documented exposure to the irritant. A reversible airflow pattern, on spirometry, with the presence of moderate to severe bronchial hyperreactivity on methacholine challenge testing and the lack of minimal lymphocytic inflammation, without eosinophilia, have also been included in the criteria for diagnosis of RADS. RADS (or asthma) following an irritating inhalation is an infrequent disorder with rates related to the concentration of and duration of exposure to the irritating substance. Industrial bronchitis, on the other hand, is a disorder that occurs as result of exposure due to high concentrations of irritating substance (often particulate in nature) and is completely reversible after exposure ceases. The disorder is characterised by dyspnea, cough and mucus production.

The material may cause skin irritation after prolonged or repeated exposure and may produce on contact skin redness, swelling, the production of vesicles, scaling and thickening of the skin.

CARCINOGEN

1,1,2-Trichloro-1,2,2-trifluoroethane [FC-113]	ND	Carcinogen Category	A4

SKIN

1,1,2-trichlorotrifluoroethane	ND	Notes	Skin
1,1,2-trichlorotrifluoroethane	ND	Notation	Skin
1,1,2-trichlorotrifluoroethane	Canada - Alberta Occupational Exposure Limits - Skin	Substance Interaction	1

Section 12 - ECOLOGICAL INFORMATION

Refer to data for ingredients, which follows:
1,1,2-TRICHLOROTRIFLUOROETHANE:

Marine Pollutant:	Yes
■ Half- life Soil - High (hours):	8640
■ Half- life Soil - Low (hours):	4320
■ Half- life Air - High (hours):	8.80E+06
■ Half- life Air - Low (hours):	3.50E+05
■ Half- life Surface water - High (hours):	8640
■ Half- life Surface water - Low (hours):	4320
■ Half- life Ground water - High (hours):	17280
■ Half- life Ground water - Low (hours):	1440
■ Aqueous biodegradation - Aerobic - High (hours):	8640
■ Aqueous biodegradation - Aerobic - Low (hours):	4320
■ Aqueous biodegradation - Anaerobic - High (hours):	34560

■ Aqueous biodegradation - Anaerobic - Low (hours):	17280
■ Photolysis maximum light absorption - High (nano- m):	240
■ Photooxidation half- life air - High (hours):	8.80E+06
■ Photooxidation half- life air - Low (hours):	3.50E+05

■ On the basis of the available evidence concerning properties and predicted or observed environmental fate and behavior, the material may present a danger to the structure and/ or functioning of the stratospheric ozone layer.

■ Toxic to aquatic organisms.

■ Do NOT allow product to come in contact with surface waters or to intertidal areas below the mean high water mark. Do not contaminate water when cleaning equipment or disposing of equipment wash-waters.

Wastes resulting from use of the product must be disposed of on site or at approved waste sites.

■ May cause long-term adverse effects in the aquatic environment.

■ For haloalkanes and haloalkenes:

Environmental fate:

Certain haloalkane gases in the atmosphere can also contribute to the greenhouse effect by restricting heat loss from the Earth's atmosphere through absorbing infrared emissions from the surface. Generally haloalkanes contributing to the greenhouse effect consist of a fully or partly fluorinated carbon backbone.

Gas-phase reactions with OH radicals are the major tropospheric loss process for the haloalkanes. In addition photooxidation reactions with O3 and NO3 radicals can result in transformation.

Organic substances containing chlorine, if primarily present in the atmospheric compartment and if their lifetime is long enough can reach the stratosphere and decompose through photolysis and other chemical reaction (e.g. with OH radical). Chlorine atoms can then participate in the catalytic ozone destruction cycles. The atmospheric lifetime is too short to enable a significant fraction of the compound emitted to reach the stratosphere

Haloalkanes do not hydrolyse easily. Acids do not catalyse the hydrolysis and base catalysis is only important at higher pHs than are observed in the environment.

The apparent hazard of halo- alkanes and alkenes to human health has prompted investigations concerning their fate in subsurface waters and in soil. Although abiotic transformations may be significant within the time scales commonly associated with groundwater movement, biotic process typically proceed much faster, provided that there are sufficient substrates, nutrients and microbial populations to mediate such transformations. Several bacterial strains including methane-utilising bacteria capable of utilising haloalkanes have been isolated. Microbial dehalogenation by these strains is mediated by enzymes (oxygenase and hydrolase). The biodegradation of haloalkanes can proceed through different pathways. Haloparaffins (C12 to C18) have been reported to be incorporated into fatty acids in bacteria, yeasts, and fungi , resulting in their accumulation in the food chain. Another pathway is the oxygenation at the nonhalogenated end of monohalogenated alkanes by an inherent oxygenase with a tight substrate selectivity In this case fluoroalkanes were defluorinated, but no dehalogenation was observed with chloro-, bromo-, or iodoalkanes. Chain length was reported to have minor effects on this oxygenation reaction. In general, alpha- and alpha,omega-chlorinated haloalkanes with short carbon chains (C1 to C6) are dehalogenated hydrolytically or by a glutathione-dependent mechanism. In contrast, alpha- and alpha,omega-haloalkanes with longer chains, e.g., 1,9-dichlorononane and 1,10-dichlorodecane (1,10-DCD), have been proposed to be dehalogenated by oxidative mechanisms. Studies on the biodegradation of this class of compounds are rare, because haloalkane-degrading microorganisms are not easily found

In water and terrestrial compartments haloalkanes may hydrolyse in the presence of naturally occurring sulfur-containing nucleophiles Bisulfide ion (HS-) is generally the most important nucleophile because it is moderately reactive and is usually present at the highest concentration. When elemental sulfur is present, polysulfides(S4 2- and S5 2-) will be more important than HS- at pH 7 (approximately) because they are 60 times more reactive and their equilibrium concentrations increase with increasing pH. The end products of such reactions include a variety of mercaptans and dialkyl sulfides.

■ Following release of CFCs into the atmosphere, they eventually enter the troposphere where they persist undegraded. Subsequently they diffuse into the stratosphere and degrade slowly (half-lives of about 20 years). In the stratosphere, CFCs react slowly with oxygen free radicals and release chlorine atoms which catalytically destroy ozone producing irreversible damage. Use of CFCs has been restricted by the Montreal Protocol on Substances that Deplete the Ozone Layer (1988) and also by US EPA Regulation 3093/94. CFCs do not degrade readily in the ambient atmosphere; some have a half- life of more than 100 years for the photochemical reaction producing hydroxy radicals. If released to the water, CFCs are most rapidly dispersed by volatilisation. If released into the soil, CFCs volatilise rapidly from surfaces or leach through the soil.

Drinking Water Standards:
hydrocarbon total: 100 ug/l (UK max.)
Soil Guidelines: none available.
Air Quality Standards: none available.

■ DO NOT discharge into sewer or waterways.

■ In addition to carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O), the greenhouse gases mentioned in the Kyoto Protocol include synthetic substances that share the common feature of being highly persistent in the atmosphere and exhibiting very high specific radiative forcing (radiative forcing is the change in the balance between radiation coming into the atmosphere and radiation out; a positive radiative forcing tends on average to warm the surface of the earth). These synthetic substances include hydrocarbons that are partially fluorinated (HCFs) or totally fluorinated (PFCs) as well as sulfur hexafluoride (SF6).

The greenhouse potential of these substances, expressed as multiples of that of CO2, are within the range of 140 to 11,700 for HFCs, from 6500 to 9,200 for PFCs and 23,900 for SF6. Once emitted into the atmosphere, these substances have an impact on the environment for decades, centuries, or in certain instances, for thousands of years.

Many of these substances have only been commercialised for a few years, and still only contribute only a small percentage of those gases released to the atmosphere by humans (anthropogenic) which increase the greenhouse effect. However, a rapid increase can be seen in their consumption and emission, and therefore in their contribution to the anthropogenic increase in the greenhouse effect.

Since the adoption of the Kyoto Protocol, new fluorinated substances have appeared on the market, which are stable in air and have a high greenhouse potential; these include nitrogen trifluoride (NF3) and fluoroethers.

log Kow: 3.16
Koc: 191-259
Half-life (hr) air: 17520-1068720
Half-life (hr) H2O surface water: 4
Henry's atm m³ /mol: 0.526

BCF: 11-34
controlled ozone depleting gases: phase out by 1996 (C)
controlled ozone depleting potential: 1.0
Fish LC50 (168 h): 0.89-1.7 mg/L
Bioaccumulation: sig

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
1,1,2-trichlorotrifluoroethane	HIGH	HIGH	LOW	MED

GESAMP/EHS COMPOSITE LIST - GESAMP Hazard Profiles

Name / Cas No / RTECS No	EHS	TRN	A1a	A1b	A1	A2	B1	B2	C1	C2	C3	D1	D2	D3	E1	E2	E3
E1:_INTER F~ / CAS:76- 13- 1 / KJ4000000			1330	2	3	2	2	NR	3	0	0	0	0	1	1	S	1

Legend: EHS=EHS Number (EHS=GESAMP Working Group on the Evaluation of the Hazards of Harmful Substances Carried by Ships) NRT=Net Register Tonnage, A1a=Bioaccumulation log Pow, A1b=Bioaccumulation BCF, A1=Bioaccumulation, A2=Biodegradation, B1=Acuteaquatic toxicity LC/ECIC50 (mg/l), B2=Chronic aquatic toxicity NOEC (mg/l), C1=Acute mammalian oral toxicity LD50 (mg/kg), C2=Acutemammalian dermal toxicity LD50 (mg/kg), C3=Acute mammalian inhalation toxicity LC50 (mg/kg), D1=Skin irritation & corrosion, D2=Eye irritation& corrosion, D3=Long-term health effects, E1=Tainting, E2=Physical effects on wildlife & benthic habitats, E3=Interference with coastal amenities, For column A2: R=Readily biodegradable, NR=Not readily biodegradable. For column D3: C=Carcinogen, M=Mutagenic, R=Reprotoxic, S=Sensitising, A=Aspiration hazard, T=Target organ systemic toxicity, L=Lunginjury, N=Neurotoxic, I=Immunotoxic. For column E1: NT=Not tainting (tested), T=Tainting test positive. For column E2: Fp=Persistent floater, F=Floater, S=Sinking substances. The numerical scales start from 0 (no hazard), while higher numbers reflect increasing hazard. (GESAMP/EHS Composite List of Hazard Profiles - Hazard evaluation of substances transported by ships)

Section 13 - DISPOSAL CONSIDERATIONS

Disposal Instructions

All waste must be handled in accordance with local, state and federal regulations.
¦ Legislation addressing waste disposal requirements may differ by country, state and/ or territory. Each user must refer to laws operating in their area. In some areas, certain wastes must be tracked.
A Hierarchy of Controls seems to be common - the user should investigate:

- Reduction
- Reuse
- Recycling
- Disposal (if all else fails)

This material may be recycled if unused, or if it has not been contaminated so as to make it unsuitable for its intended use. If it has been contaminated, it may be possible to reclaim the product by filtration, distillation or some other means. Shelf life considerations should also be applied in making decisions of this type. Note that properties of a material may change in use, and recycling or reuse may not always be appropriate.
DO NOT allow wash water from cleaning equipment to enter drains. Collect all wash water for treatment before disposal.

- Recycle wherever possible or consult manufacturer for recycling options.
- Consult Waste Management Authority for disposal.
- Bury or incinerate residue at an approved site.
- Recycle containers if possible, or dispose of in an authorized landfill.

Section 14 - TRANSPORTATION INFORMATION

DOT:

Symbols:	G	Hazard class or Division:	9
Identification Numbers:	UN3082	PG:	III
Label Codes:	9	Special provisions:	8, 146, 335, IB3, T4, TP1, TP29
Packaging: Exceptions:	155	Packaging: Non-bulk:	203

Packaging: Exceptions:	155	Quantity limitations: Passenger aircraft/rail:	No limit
Quantity Limitations: Cargo aircraft only:	No limit	Vessel stowage: Location:	A
Vessel stowage: Other:	None		

Hazardous materials descriptions and proper shipping names:
Environmentally hazardous substance, liquid, n.o.s

Air Transport IATA:

ICAO/IATA Class:	9	ICAO/IATA Subrisk:	None
UN/ID Number:	3082	Packing Group:	III
Special provisions:	A97		

Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. *(CONTAINS 1,1,2-TRICHLOROTRIFLUOROETHANE)

Maritime Transport IMDG:

IMDG Class:	9	IMDG Subrisk:	None
UN Number:	3082	Packing Group:	III
EMS Number:	F-A , S-F	Special provisions:	179 274 335 909
Limited Quantities:	5 L	Marine Pollutant:	Yes

Shipping Name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S.(contains 1,1,2-trichlorotrifluoroethane)

Section 15 - REGULATORY INFORMATION

REGULATIONS

1,1,2-trichlorotrifluoroethane (CAS: 76-13-1) is found on the following regulatory lists;

"Canada - Alberta Occupational Exposure Limits","Canada - British Columbia Occupational Exposure Limits","Canada - Northwest Territories Occupational Exposure Limits (English)","Canada - Nova Scotia Occupational Exposure Limits","Canada - Ontario Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits","Canada - Prince Edward Island Occupational Exposure Limits - Carcinogens","Canada - Quebec Permissible Exposure Values for Airborne Contaminants (English)","Canada - Saskatchewan Occupational Health and Safety Regulations - Contamination Limits","Canada - Yukon Permissible Concentrations for Airborne Contaminant Substances","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (English)","Canada Toxicological Index Service - Workplace Hazardous Materials Information System - WHMIS (French)","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk","OECD Representative List of High Production Volume (HPV) Chemicals","US - Alaska Limits for Air Contaminants","US - California Air Toxics ""Hot Spots"" List (Assembly Bill 2588) Substances for which emissions must be quantified","US - California Occupational Safety and Health Regulations (CAL/OSHA) - Hazardous Substances List","US - California Permissible Exposure Limits for Chemical Contaminants","US - Connecticut Hazardous Air Pollutants","US - Hawaii Air Contaminant Limits","US - Idaho - Limits for Air Contaminants","US - Michigan Exposure Limits for Air Contaminants","US - Minnesota Hazardous Substance List","US - Minnesota Permissible Exposure Limits (PELs)","US - New Jersey Right to Know Hazardous Substances","US - Oregon Permissible Exposure Limits (Z-1)","US - Pennsylvania - Hazardous Substance List","US - Rhode Island Hazardous Substance List","US - Tennessee Occupational Exposure Limits - Limits For Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Final Rule Limits for Air Contaminants","US - Vermont Permissible Exposure Limits Table Z-1-A Transitional Limits for Air Contaminants","US - Washington Permissible exposure limits of air contaminants","US - Wyoming Toxic and Hazardous Substances Table Z1 Limits for Air Contaminants","US ACGIH Threshold Limit Values (TLV)","US ACGIH Threshold Limit Values (TLV) - Carcinogens","US Department of Transportation (DOT) List of Hazardous Substances and Reportable Quantities - Hazardous Substances Other Than Radionuclides","US DOE Temporary Emergency Exposure Limits (TEELs)","US EPA High Production Volume Program Chemical List","US EPCRA Section 313 Chemical List","US Food Additive Database","US List of Lists - Consolidated List of Chemicals Subject to the Emergency Planning and Community Right-to-Know Act (EPCRA) and Section 112(r) of the Clean Air Act","US NIOSH Recommended Exposure Limits (RELs)","US OSHA Permissible Exposure Levels (PELs) - Table Z1","US RCRA (Resource Conservation & Recovery Act) - Phase 4 LDR Rule - Universal Treatment Standards","US Spacecraft Maximum Allowable Concentrations (SMACs) for Airborne Contaminants","US Toxic Substances Control Act (TSCA) - Inventory","US TSCA Section 8 (d) - Health and Safety Data Reporting"

Section 16 - OTHER INFORMATION

LIMITED EVIDENCE

■ Inhalation may produce health damage*.
■ Cumulative effects may result following exposure*.
■ Vapors potentially cause drowsiness and dizziness*.
* (limited evidence).

■ Classification of the mixture and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings. Risks may be determined by reference to Exposures Scenarios. Scale of use, frequency of use and current or available engineering controls must be considered.

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