CRC (NZ) 5087 Brakleen Blaster Aerosol

Hazard Alert Code:
HIGH

(Chemwatch name: CRC (NZ) 5087 BRAKLEEN BLASTER AEROSOL)

Chemwatch Material Safety Data Sheet
Version No: 2.0
Chemwatch 21-8162
Issue Date: 14-May-2011
CD 2011/3
NA477TCP

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
CRC (NZ) 5087 Brakleen Blaster Aerosol

STATEMENT OF HAZARDOUS NATURE
Considered a Hazardous Substance according to the criteria of the New Zealand Hazardous Substances New Organisms legislation.

PROPER SHIPPING NAME
AEROSOLS

PRODUCT USE
■ The use of a quantity of material in an unventilated or confined space may result in increased exposure and an irritating atmosphere developing. Before starting consider control of exposure by mechanical ventilation. Application is by spray atomisation from a hand held aerosol pack. Degreasing brake parts.

SUPPLIER
Company: CRC Industries New Zealand
Address:
10 Highbrook Drive
East Tamaki
Auckland,
New Zealand
Telephone: +64 9 272 2700
Fax: +64 9 274 9696
Email: customerservices@crc.co.nz
Website: www.crc.co.nz

Section 2 - HAZARDS IDENTIFICATION

CHEMWATCH HAZARD RATINGS

		Min	Max
Flammability:	3		
Toxicity:	2		
Body Contact:	2		
Reactivity:	2		
Chronic:	2		

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

GHS Classification
Acute Aquatic Hazard Category 2
Carcinogen Category 2
Chronic Aquatic Hazard Category 1
Eye Irritation Category 2B
Flammable Aerosol Category 1
Reproductive Toxicity Category 1B
Skin Corrosion/Irritation Category 2
STOT - SE (Resp. Irr.) Category 3

EMERGENCY OVERVIEW
HAZARD
DANGER
Determined by Chemwatch using GHS/HSNO criteria:
2.1.2A 6.3A 6.4A 6.7B 6.8A 6.9 9.1A
Extremely flammable aerosol
Causes skin irritation
Causes eye irritation
Suspected of causing cancer

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May damage fertility
May cause respiratory irritation
Very toxic to aquatic life with long lasting effects

PRECAUTIONARY STATEMENTS

Prevention

Obtain special instructions before use.
Do not handle until all safety precautions have been read and understood.
Keep away from heat/sparks/open flames/hot surfaces. - No smoking.
Do not spray on an open flame or other ignition source.
Pressurized container: Do not pierce or burn, even after use.
Avoid breathing dust/fume/gas/mist/vapours/spray.
Wash ... thoroughly after handling.
Use only outdoors or in a well-ventilated area.
Avoid release to the environment.
Wear protective gloves/protective clothing/eye protection/face protection.
Use personal protective equipment as required.

Response

IF INHALED: Remove to fresh air and keep at rest in a position comfortable for breathing.
IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
IF exposed or concerned: Get medical advice/ attention.
Call a POISON CENTER or doctor/physician if you feel unwell.
If eye irritation persists: Get medical advice/attention.
Collect spillage.

Storage

Store in a well-ventilated place. Keep container tightly closed.
Store locked up.
Protect from sunlight. Do not expose to temperatures exceeding 50 oC/ 122 oF.

Disposal

Dispose of contents/container to ...

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
perchloroethylene	127-18-4	20-40
methylene chloride	75-09-2	5-20
heptane	142-82-5	20-40
carbon dioxide	124-38-9	1-9

NOTE: Manufacturer has supplied full ingredient information to allow CHEMWATCH assessment.

Section 4 - FIRST AID MEASURES

NEW ZEALAND POISONS INFORMATION CENTRE 0800 POISON (0800 764 766) NZ EMERGENCY SERVICES: 111

SWALLOWED

■

- Avoid giving milk or oils.
- Avoid giving alcohol.
- Not considered a normal route of entry.
- For advice, contact a Poisons Information Centre or a doctor.
- If spontaneous vomiting appears imminent or occurs, hold patient's head down, lower than their hips to help avoid possible aspiration of vomitus.

EYE

■ If aerosols come in contact with the eyes:

- Immediately hold the eyelids apart and flush the eye continuously for at least 15 minutes with fresh 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.
- Transport to hospital or doctor without delay.
- Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

SKIN

■ If solids or aerosol mists are deposited upon the skin:

- Flush skin and hair with running water (and soap if available).
- Remove any adhering solids with industrial skin cleansing cream.
- DO NOT use solvents.

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- Seek medical attention in the event of irritation.

INHALED

■ If aerosols, fumes or combustion products are inhaled:

- Remove to fresh air.
- 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.
- If breathing is shallow or has stopped, ensure clear airway and apply resuscitation, 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 acute or short term repeated exposures to petroleum distillates or related hydrocarbons:

- Primary threat to life, from pure petroleum distillate ingestion and/or inhalation, is respiratory failure.
- Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnoea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases (pO2 50 mm Hg) should be intubated.
- Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
- A chest x-ray should be taken immediately after stabilisation of breathing and circulation to document aspiration and detect the presence of pneumothorax.
- Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitisation to catecholamines. Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.
- Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients. [Ellenhorn and Barceloux: Medical Toxicology]

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 sensitisation 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, haemodialysis, haemoperfusion, or repeat-dose charcoal.

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

- Do not administer sympathomimetic drugs unless absolutely necessary as material may increase myocardial irritability.
- No specific antidote.
- Because rapid absorption may occur through lungs if aspirated and cause systematic effects, the decision of whether to induce vomiting or not should be made by an attending physician.
- If lavage is performed, suggest endotracheal and/or esophageal control.
- Danger from lung aspiration must be weighed against toxicity when considering emptying the stomach.
- Treatment based on judgment of the physician in response to reactions of the patient

Treat symptomatically.

For acute or short term repeated exposures to perchloroethylene:

- Tetrachloroethylene / perchloroethylene is well absorbed through the lungs with peak levels more important than duration in determining blood concentration. Lungs excrete most of the absorbed tetrachloroethylene in an unchanged state; about 3% is converted by the liver to form trichloracetic acid and subsequently excreted by the kidney. Exhaled material has a biological half-life of 65 hours.

INHALATION:

- The treatment of acute inhalation exposures is supportive with initial attention directed to evaluation / support of ventilation and circulation. As with all hydrocarbons care must be taken to reduce the risk of aspiration by proper positioning and medical observation.

INGESTION:

- The ingestion level at which emesis should be induced is difficult to predict in the absence of extensive human studies.
- The role of charcoal and cathartics remains uncertain.

[Ellenhorn and Barceloux: Medical Toxicology]BIOLOGICAL EXPOSURE INDEX - BEI These represent the determinants observed in specimens collected from a healthy worker who has been exposed at the Exposure Standard (ES or TLV):

Determinant	Index	Sampling Time	Comments
1. Perchloroethylene in end-exhaled air	10 ppm	Prior to last shift of work-week	
2. Perchloroethylene in blood	1 mg/L	Prior to last shift of work-week	
3. Trichloroacetic acid in urine	7 mg/L	End of work-week	NS, SQ

NS: Non-specific determinant; also seen after exposure to other materials

SQ: Semi-quantitative determinant - Interpretation may be ambiguous; should be used as a screening test or confirmatory test.

Section 5 - FIRE FIGHTING MEASURES

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EXTINGUISHING MEDIA

■ SMALL FIRE:

- Water spray, dry chemical or CO2

LARGE FIRE:

- Water spray or fog.

FIRE FIGHTING

■

- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water course.
- If safe, switch off electrical equipment until vapour fire hazard removed.
- Use water delivered as a fine spray to control fire and cool adjacent 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.

FIRE/EXPLOSION HAZARD

■ Combustion products include: carbon dioxide (CO2).

- Liquid and vapour are highly flammable.
- Severe fire hazard when exposed to heat or flame.
- Vapour forms an explosive mixture with air.
- Severe explosion hazard, in the form of vapour, when exposed to flame or spark.
- Vapour may travel a considerable distance to source of ignition.
- Heating may cause expansion or decomposition with violent container rupture.
- Aerosol cans may explode on exposure to naked flames.
- Rupturing containers may rocket and scatter burning materials.
- Hazards may not be restricted to pressure effects.
- May emit acrid, poisonous or corrosive fumes.
- On combustion, may emit toxic fumes of carbon monoxide (CO).

, carbon monoxide (CO), hydrogen chloride, phosgene, other pyrolysis products typical of burning organic material. Contains low boiling substance: Closed containers may rupture due to pressure buildup under fire conditions.

May emit clouds of acrid smoke.

FIRE INCOMPATIBILITY

■

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

Personal Protective Equipment

Breathing apparatus.
Gas tight chemical resistant suit.
Limit exposure duration to 1 BA set 30 mins.

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS

■

- Clean up all spills immediately.
- Avoid breathing vapours and contact with skin and eyes.
- Wear protective clothing, impervious gloves and safety glasses.
- Shut off all possible sources of ignition and increase ventilation.
- Wipe up.
- If safe, damaged cans should be placed in a container outdoors, away from all ignition sources, until pressure has dissipated.
- Undamaged cans should be gathered and stowed safely.

MAJOR SPILLS

■

- Remove leaking cylinders to a safe place if possible.
- Release pressure under safe, controlled conditions by opening the valve.
- DO NOT exert excessive pressure on valve; DO NOT attempt to operate damaged valve.
- Clear area of personnel and move upwind.
- Alert Fire Brigade and tell them location and nature of hazard.
- May be violently or explosively reactive.
- Wear breathing apparatus plus protective gloves.
- Prevent, by any means available, spillage from entering drains or water courses
- No smoking, naked lights or ignition sources.
- Increase ventilation.
- Stop leak if safe to do so.
- Water spray or fog may be used to disperse / absorb vapour.
- Absorb or cover spill with sand, earth, inert materials or vermiculite.
- If safe, damaged cans should be placed in a container outdoors, away from ignition sources, until pressure has dissipated.

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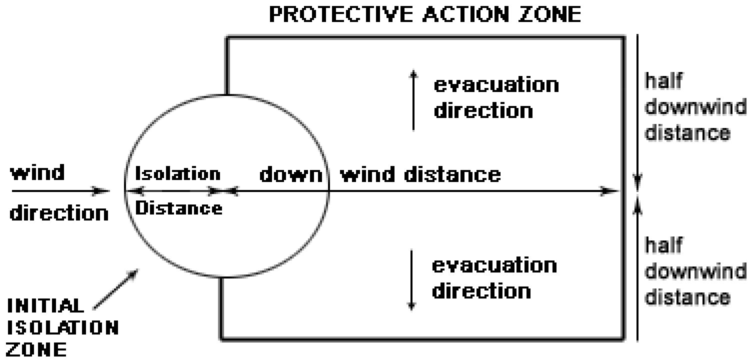
- Undamaged cans should be gathered and stowed safely.
- Collect residues and seal in labelled drums for disposal.

PROTECTIVE ACTIONS FOR SPILL



From IERG (Canada/Australia)	
Isolation Distance	-
Downwind Protection Distance	8 metres
IERG Number	49

From US Emergency Response Guide 2000 Guide 126

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 126 is taken from the US DOT emergency response guide book.
6 IERG information is derived from CANUTEC - Transport Canada.

EMERGENCY RESPONSE PLANNING GUIDELINES (ERPG)

The maximum airborne concentration below which it is believed that nearly all individuals could be exposed for up to one hour WITHOUT experiencing or developing

life-threatening health effects is:

perchloroethylene	1000ppm
methylene chloride	4000ppm

irreversible or other serious effects or symptoms which could impair an individual's ability to take protective action is:

perchloroethylene	200ppm
methylene chloride	750ppm

other than mild, transient adverse effects without perceiving a clearly defined odour is:

perchloroethylene	100ppm
methylene chloride	200ppm

American Industrial Hygiene Association (AIHA)

Ingredients considered according exceed the following cutoffs

Very Toxic (T+)	>= 0.1%	Toxic (T)	>= 3.0%
R50	>= 0.25%	Corrosive (C)	>= 5.0%
R51	>= 2.5%		
else	>= 10%		

where percentage is percentage of ingredient found in the mixture

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

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PROCEDURE FOR HANDLING

■

- Avoid all personal contact, including inhalation.
- Wear protective clothing when risk of exposure occurs.
- Use in a well-ventilated area.
- Prevent concentration in hollows and sumps.
- DO NOT enter confined spaces until atmosphere has been checked.
- Avoid smoking, naked lights or ignition sources.
- Avoid contact with incompatible materials.
- When handling, DO NOT eat, drink or smoke.
- DO NOT incinerate or puncture aerosol cans.
- DO NOT spray directly on humans, exposed food or food utensils.
- Avoid physical damage to containers.
- Always wash hands with soap and water after handling.
- Work clothes should be laundered separately.
- 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.

SUITABLE CONTAINER

■

- DO NOT use aluminium or galvanised containers
- Aerosol dispenser.
- Check that containers are clearly labelled.

STORAGE INCOMPATIBILITY

■

- Haloalkenes are highly reactive.
- Some of the more lightly substituted lower members are highly flammable; many members of the group are peroxidisable and polymerisable.
- Avoid reaction or 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.

BRETHERICK L.: Handbook of Reactive Chemical Hazards

- Avoid reaction with metal halides and active metals, eg. sodium (Na), potassium (K), calcium (Ca), zinc (Zn), powdered aluminium (Al), magnesium (Mg) and magnesium alloys.
- Avoid contact with rubber, and plastics such as methacrylate polymers, polyethylene and polystyrene

Tetrachloroethylene:

- decomposes slowly in contact with water or moisture forming trichloroacetic acid and hydrochloric acid
- reacts violently with concentrated nitric acid (producing carbon dioxide), strong oxidisers, strong alkalis, powdered chemically active metals such as aluminium, barium, beryllium, lithium, zinc
- is incompatible with nitrogen tetroxide, finely divided metals
- decomposes in UV light, on contact with red-hot metals, and at temperatures above 150 C, releasing hydrogen chloride, carbon monoxide and phosgene
- corrodes metals in the presence of moisture
- can oxidise in presence of air and light.

The presence of 0.5% trichloroethylene as an impurity caused generation of dichloroacetylene during unheated drying over solid sodium hydroxide. Subsequent fractional distillation produced an explosion.

- Segregate from alcohol, water.

STORAGE REQUIREMENTS

■

- Store below 38 deg. C.
- Keep dry to avoid corrosion of cans. Corrosion may result in container perforation and internal pressure may eject contents of can
- Store in original containers in approved flammable liquid storage area.
- DO NOT store in pits, depressions, basements or areas where vapours may be trapped.
- No smoking, naked lights, heat or ignition sources.
- Keep containers securely sealed. Contents under pressure.
- Store away from incompatible materials.
- Store in a cool, dry, well ventilated area.
- Avoid storage at temperatures higher than 40 deg C.
- Store in an upright position.
- Protect containers against physical damage.
- Check regularly for spills and leaks.
- Observe manufacturer's storing and handling recommendations.

SAFE STORAGE WITH OTHER CLASSIFIED CHEMICALS

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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/m³	STEL ppm	STEL mg/m³	Peak ppm	Peak mg/m³	TWA F/CC	Notes
New Zealand Workplace Exposure Standards (WES)	perchloroethylene (Perchloroethylene)	50	335	150	1005				Suspected Carcinogen
New Zealand Workplace Exposure Standards (WES)	methylene chloride (Methylene chloride)	50	174						Suspected Carcinogen
New Zealand Workplace Exposure Standards (WES)	heptane (Heptane (n-Heptane))	400	1,640	500	2,050				
New Zealand Workplace Exposure Standards (WES)	carbon dioxide (Carbon dioxide)	5,000	9,000	30,000	54,000				

EMERGENCY EXPOSURE LIMITS

Material	FROMSYN~	GALSYN~
ORIGIDLHPP~	FROMSYN~	GALSYN~
ORIGIDLHPP~	FROMSYN~	GALSYN~
ORIGIDLHPP~	FROMSYN~	GALSYN~
ORIGIDLHPP~	FROMSYN~	GALSYN~
ORIGIDLHPP~		

MATERIAL DATA

METHYLENE CHLORIDE:
PERCHLOROETHYLENE:
■ Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for the reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.
:
CRC (NZ) 5087 BRAKLEEN BLASTER AEROSOL:
PERCHLOROETHYLENE:
■ Odour Threshold Value for tetrachloroethylene (perchloroethylene): 47 ppm (detection), 71 ppm (recognition)
NOTE: Detector tubes for perchloroethylene, measuring in excess of 10 ppm, are commercially available.
Exposure at or below the TLV-TWA is thought to prevent discomfort and subjective complaints arising during controlled human studies and prolonged industrial exposure to perchloroethylene at 100 ppm and 200 ppm.
The STEL is recommended to minimise the potential of anaesthetic effects.
Possible liver injury is unlikely as these values are thought to provide a wide margin of safety.
On the basis of pharmacokinetic parameters and metabolic fate of perchloroethylene and in the absence of exposures which induce overt liver injury there is no expectation, by ACGIH, of a detectable increased risk of human liver cancer.
CRC (NZ) 5087 BRAKLEEN BLASTER AEROSOL:
HEPTANE:
■ for heptane (all isomers)
The TLV-TWA is protective against narcotic and irritant effects which are greater than those of pentane or n-hexane but less than those of octane. The TLV-TWA applies to all isomers.
Inhalation by humans of 1000 ppm for 6 minutes produced slight dizziness. Higher concentrations for shorter periods produce marked vertigo, incoordination and hilarity. Signs of central nervous system depression occur in the absence of mucous membrane irritation. Brief exposures to high levels (5000 ppm for 4 minutes) produce nausea, loss of appetite and a "gasoline-like" taste in the mouth that persists for many hours after exposure ceases.
METHYLENE CHLORIDE:
■ For methylene chloride
Odour Threshold Value: 158 ppm (detection), 227 ppm (recognition)
NOTE: Detector tubes for methylene chloride, measuring in excess of 25 ppm are commercially available. Long-term measurements (4 hrs) may be conducted to detect concentrations exceeding 13 ppm.

Exposure at or below the recommended TLV-TWA (and in the absence of occupational exposure to carbon monoxide) is thought to minimise the potential for liver injury and to provide protection against the possible weak carcinogenic effects which have been demonstrated in laboratory rats and mice. Enhancement of tumours of the lung, liver, salivary glands and mammary tissue in rodent studies has lead NIOSH to recommend a more conservative outcome. The ACGIH however concludes that in the absence of documentation of health-related injuries at higher exposures after a long history of methylene chloride use and a number of epidemiologic studies, the recommended TLV-TWA provides an adequate margin of safety.

Concentration effects:

Concentration	Clinical effects
>300 ppm	Sweet odour
500-1000 ppm (1-2 h)	Unpleasant odour, slight anaesthetic effects, headache, light-headedness, eye irritation and elevated COHb concentration
2300 ppm (5 min.)	Odour strong, intensely irritating; dizziness
7200 ppm (8-16 min)	Paraesthesia, tachycardia
>50000 ppm	Immediately life-threatening

.

CARBON DIOXIDE:

■ May act as a simple asphyxiants; these are gases which, when present in high concentrations, reduce the oxygen content in air below that required to support breathing, consciousness and life; loss of consciousness, with death by suffocation may rapidly occur in an oxygen deficient atmosphere.

CARE: Most simple asphyxiants are odourless or possess low odour and there is no warning on entry into an oxygen deficient atmosphere. If there is any doubt, oxygen content can be checked simply and quickly. It may not be appropriate to only recommend an exposure standard for simple asphyxiants rather it is essential that sufficient oxygen be maintained. Air normally has 21 percent oxygen by volume, with 18 percent regarded as minimum under normal atmospheric pressure to maintain consciousness / life. At pressures significantly higher or lower than normal atmospheric pressure, expert guidance should be sought.

For carbon dioxide:

NOTE: Detector tubes for carbon dioxide, measuring in excess of 0.01 % vol.,are commercially available. Long-term measurements (4 hrs) may be conducted to detect concentrations exceeding 250 ppm.

Studies using physically fit males in confined spaces indicate the TLV-TWA and STEL provides a wide margin of safety against asphyxiation and from undue metabolic stress, provided normal amounts of oxygen are present in inhaled air. Lowered oxygen content, increased physical activity and prolonged exposures each impact on systemic and respiratory effects.

Stimulation of the respiratory centre is produced at 50,000 ppm (5%). The gas is weakly narcotic at 30,000 ppm giving rise to reduced acuity of hearing and increasing blood pressure and pulse, Persons exposed a 20,000 ppm for several hours developed headaches and dyspnea on mild exertion, Acidosis and adrenal cortical exhaustion occurred as a result of prolonged continuous exposure at 10,000-20,0000 ppm.

Intoxication occurs after a 30 minute exposure at 50,000 ppm whilst exposure at 70,000-100,000 ppm produces unconsciousness within a few minutes.

Odour Safety Factor (OSF)

OSF=0.068 (CARBON DIOXIDE).

PERSONAL PROTECTION

EYE

■ No special equipment for minor exposure i.e. when handling small quantities.

OTHERWISE: For potentially moderate or heavy exposures:

- Safety glasses with side shields.
- NOTE: Contact lenses pose a special hazard; soft lenses may absorb irritants and ALL lenses concentrate them.

HANDS/FEET

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

- 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, AS/NZS 2161.1 or national equivalent).

- 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, AS/NZS 2161.10.1 or national equivalent) 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, AS/NZS 2161.10.1 or national equivalent) 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.

- Neoprene rubber gloves
- No special equipment needed when handling small quantities.
- OTHERWISE:

- For potentially moderate exposures:
- Wear general protective gloves, eg. light weight rubber gloves.
- For potentially heavy exposures:
- Wear chemical protective gloves, eg. PVC. and safety footwear.

OTHER

■

- The clothing worn by process operators insulated from earth may develop static charges far higher (up to 100 times) than the minimum ignition energies for various flammable gas-air mixtures. This holds true for a wide range of clothing materials including cotton.
- Avoid dangerous levels of charge by ensuring a low resistivity of the surface material worn outermost.

BRETHERICK: Handbook of Reactive Chemical Hazards.

- Some plastic personal protective equipment (PPE) (e.g. gloves, aprons, overshoes) are not recommended as they may produce static electricity.
- For large scale or continuous use wear tight-weave non-static clothing (no metallic fasteners, cuffs or pockets), non sparking safety footwear.

No special equipment needed when handling small quantities.
OTHERWISE:

- Overalls.
- Skin cleansing cream.
- Eyewash unit.
- Do not spray on hot surfaces.

RESPIRATOR

■

- Positive pressure, full face, air-supplied breathing apparatus should be used for work in enclosed spaces if a leak is suspected or the primary containment is to be opened (e.g. for a cylinder change)
- Air-supplied breathing apparatus is required where release of gas from primary containment is either suspected or demonstrated.

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: perchloroethylene, heptane, methylene chloride

■ Protective Material CPI *.

NITRILE+PVC	C
NITRILE	C
PVC	C
NEOPRENE	C
PVA	C
NATURAL RUBBER	C
VITON	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.

Required minimum protection factor	Maximum gas/vapour concentration present in air p.p.m. (by volume)	Half-face Respirator	Full-Face Respirator
up to 10	1000	GAX-AUS / Class1	-
up to 50	1000	-	GAX-AUS / Class 1
up to 50	5000	Airline *	-
up to 100	5000	-	GAX-2
up to 100	10000	-	GAX-3
100+			Airline**

* - Continuous Flow ** - Continuous-flow or positive pressure demand
A(All classes) = Organic vapours, B AUS or B1 = Acid gasses, B2 = Acid gas or hydrogen cyanide(HCN), B3 = Acid gas or hydrogen cyanide(HCN), E = Sulfur dioxide(SO2), G = Agricultural chemicals, K = Ammonia(NH3), Hg = Mercury, NO = Oxides of nitrogen, MB = Methyl bromide, AX = Low boiling point organic compounds(below 65 degC).
The local concentration of material, quantity and conditions of use determine the type of personal protective equipment required.

CRC (NZ) 5087 Brakleen Blaster Aerosol

Hazard Alert Code: HIGH

(Chemwatch name: CRC (NZ) 5087 BRAKLEEN BLASTER AEROSOL)

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For further information consult site specific CHEMWATCH data (if available), or your Occupational Health and Safety Advisor.

ENGINEERING CONTROLS

■ CARE: Use of a quantity of this material in confined space or poorly ventilated area, where rapid build up of concentrated atmosphere may occur, could require increased ventilation and/or protective gear.
Engineering controls are used to remove a hazard or place a barrier between the worker and the hazard. Well-designed engineering controls can be highly effective in protecting workers and will typically be independent of worker interactions to provide this high level of protection.
The basic types of engineering controls are:
Process controls which involve changing the way a job activity or process is done to reduce the risk.
Enclosure and/or isolation of emission source which keeps a selected hazard "physically" away from the worker and ventilation that strategically "adds" and "removes" air in the work environment. Ventilation can remove or dilute an air contaminant if designed properly. The design of a ventilation system must match the particular process and chemical or contaminant in use.
Employers may need to use multiple types of controls to prevent employee overexposure.
General exhaust is adequate under normal conditions. If risk of overexposure exists, wear SAA approved respirator. Correct fit is essential to obtain adequate protection.
Provide adequate ventilation in warehouse or closed storage areas.
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:	Speed:
aerosols, (released at low velocity into zone of active generation)	0.5-1 m/s
direct spray, spray painting in shallow booths, gas discharge (active generation into zone of rapid air motion)	1-2.5 m/s (200-500 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 favourable 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

APPEARANCE

Clear, water white, flammable liquid with ethereal odour; not miscible with water. Supplied as an aerosol pack. Contents under PRESSURE. Contains carbon dioxide propellant.

PHYSICAL PROPERTIES

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

State	Liquid	Molecular Weight	Not applicable
Melting Range (°C)	Not available	Viscosity	Not Available
Boiling Range (°C)	40 initial	Solubility in water (g/L)	Immiscible
Flash Point (°C)	10	pH (1% solution)	Not applicable
Decomposition Temp (°C)	Not Available	pH (as supplied)	Not applicable
Autoignition Temp (°C)	Not available	Vapour Pressure (kPa)	26.6 @ 20 C
Upper Explosive Limit (%)	22	Specific Gravity (water=1)	1.07
Lower Explosive Limit (%)	1.4	Relative Vapour Density (air=1)	>1
Volatile Component (%vol)	100	Evaporation Rate	Very fast.

Section 10 - CHEMICAL STABILITY

CONDITIONS CONTRIBUTING TO INSTABILITY

■

- Elevated temperatures.
- Presence of open flame.
- Product is considered stable.
- Hazardous polymerisation will not occur.

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

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Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS

ACUTE HEALTH EFFECTS

SWALLOWED

■ Swallowing of the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis; serious consequences may result. (ICSC13733).
Accidental ingestion of the material may be damaging to the health of the individual.
When tetrachloroethylene is used in the treatment of hookworm (4.5 to 6.5 gm orally) the only adverse effect is a drunken-like state. Transient liver toxicity in patients given single oral doses of up to 5 ml had been recorded.

EYE

■ Limited evidence or practical experience suggests, that the material may cause eye irritation in a substantial number of individuals. Prolonged eye contact may cause inflammation characterised by a temporary redness of the conjunctiva (similar to windburn).
Not considered to be a risk because of the extreme volatility of the gas.
Irritation of the eyes may produce a heavy secretion of tears (lachrymation).
Exposure to high concentrations of tetrachloroethylene vapour causes mild to severe eye irritation, burning or stinging sensations depending on the dose and duration of exposure. Colour vision has equally being reported which is attributed to neurological rather than a direct effect on the eyes.
The liquid may produce eye discomfort and is capable of causing temporary impairment of vision and/or transient eye inflammation, ulceration.

SKIN

■ Skin contact with the material may damage the health of the individual; systemic effects may result following absorption.
There is some evidence to suggest that the material may cause significant and severe inflammation of the skin either following direct contact or after a delay of some time. Repeated exposure can cause contact dermatitis which is characterised by redness, swelling and blistering.
Spray mist may produce discomfort.
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.
Industrial experience shows that exposure to tetrachloroethylene produces localised skin irritation while prolonged skin contact can cause chemical burns and blistering.
Absorption by skin may readily exceed vapour inhalation exposure. Symptoms for skin absorption are the same as for inhalation.

INHALED

■ Inhalation of vapours may cause drowsiness and dizziness. This may be accompanied by sleepiness, reduced alertness, loss of reflexes, lack of co-ordination, and vertigo.
Inhalation of aerosols (mists, fumes), generated by the material during the course of normal handling, may be damaging to the health of the individual.
There is some evidence to suggest that the material can cause respiratory irritation in some persons. The body's response to such irritation can cause further lung damage.
Inhalation hazard is increased at higher temperatures.
Inhalation of high concentrations of gas/vapour causes lung irritation with coughing and nausea, central nervous depression with headache and dizziness, slowing of reflexes, fatigue and inco-ordination.
Central nervous system (CNS) depression may include general discomfort, symptoms of giddiness, headache, dizziness, nausea, anaesthetic effects, slowed reaction time, slurred speech and may progress to unconsciousness. Serious poisonings may result in respiratory depression and may be fatal.
Inhalation, by humans, of 1000 ppm heptane for 6 minutes was associated with slight dizziness; inhalation of higher concentrations for shorter periods, resulted in marked vertigo, incoordination, and hilarity. Signs of central nervous system (CNS) involvement occurred in the absence of noticeable mucous membrane irritation and were noticed promptly on entering such atmospheres.
Concentrations of 10,000-15,000 ppm, heptane produced narcosis on mice within 30-50 minutes. Exposure at higher concentrations (15,000-20,000 ppm) for 30-60 minutes caused convulsions and death in mice; inhalation of 48,000 ppm produced respiratory arrest in three of four head-exposed mice within 3 minutes. Brief exposure (4 minutes) to high levels (5000 ppm) produced nausea, loss of appetite and a "gasoline-taste" that persisted for several hours post-exposure.
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.
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).
Material is highly volatile and may quickly form a concentrated atmosphere in confined or unventilated areas. Vapour 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.
WARNING:Intentional misuse by concentrating/inhaling contents may be lethal.
Exposure to high levels of tetrachloroethylene by oral or inhalation may cause dose dependent light-headedness, mood and behavioural changes, seizure, unconsciousness, abnormal bilirubin level, liver and kidney damage in workers. Sudden death may result from anaesthetic doses probably due to depression of the respiratory centre or heart dysfunction. Human studies showed dose dependent neurologic symptoms. It may cause irritation of the eyes, airways and skin.

CHRONIC HEALTH EFFECTS

■ There has been concern that this material can cause cancer or mutations, but there is not enough data to make an assessment.
Substance accumulation, in the human body, may occur and may cause some concern following repeated or long-term occupational exposure.
There is some evidence from animal testing that exposure to this material may result in reduced fertility.
There is some evidence from animal testing that exposure to this material may result in toxic effects to the unborn baby.
Principal route of occupational exposure to the gas is by inhalation.
Exposure to tetrachloroethylene noted in dry cleaners causes menstrual disorder and miscarriage, liver dysfunction, headache and dizziness. Studies done showed high mortality rate resulting from cancers of the lung, cervix, gullet, kidney, skin, lymph/blood system, and colon in dry

cleaners and laundry workers. Liver cancer was detected in females but none in male laundry and dry cleaners. However, there is not sufficient statistical data to make an absolute conclusion.
The reactivity of an epoxide intermediate may be the reason for the cancer-causing properties of halogenated oxiranes. It is reported that 1,1-dichloroethyne, vinyl chloride, trichloroethylene, tetrachloroethylene and chloroprene all cause cancer. Chloroprene has been reported to cause chromosomal abnormalities, and an increased incidence of skin and lung cancer in animal testing.
Generally speaking, substances with one halogen substitution show higher potential to cause cancer compared to substances with two.

TOXICITY AND IRRITATION

■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.
PERCHLOROETHYLENE:
METHYLENE CHLORIDE:
CRC (NZ) 5087 BRAKLEEN BLASTER AEROSOL:
■ The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) thickening of the epidermis.
Histologically there may be intercellular oedema of the spongy layer (spongiosis) and intracellular oedema of the epidermis. Prolonged contact is unlikely, given the severity of response, but repeated exposures may produce severe ulceration.
PERCHLOROETHYLENE:
CRC (NZ) 5087 BRAKLEEN BLASTER AEROSOL:
■ The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.
CRC (NZ) 5087 BRAKLEEN BLASTER AEROSOL:

PERCHLOROETHYLENE:

TOXICITY	IRRITATION
Oral (rat) LD50: 2629 mg/kg	Skin (rabbit): 810 mg/24h -SEVERE
Inhalation (man) LDLo: 2857 mg/kg	Eye (rabbit): 162 mg -Mild
Inhalation (human) TCLo: 96 ppm/7 hrs	
Inhalation (man) TCLo: 280 ppm/2 hrs	
Inhalation (man) TCLo: 600 ppm/10 min	
Inhalation (rat) LCLo: 34200 mg/m³/8 hr	

■ WARNING: This substance has been classified by the IARC as Group 2A: Probably Carcinogenic to Humans.

TOXICITY	IRRITATION
METHYLENE CHLORIDE:	
Oral (human) LDLo: 357 mg/kg	Skin (rabbit): 810 mg/24hr-SEVERE
Oral (rat) LD50: 1600 mg/kg	Skin (rabbit): 100mg/24hr-Moderate
Inhalation (human) TCLo: 500 ppm/ 8 hr	Eye(rabbit): 162 mg - Moderate
Inhalation (rat) LC50: 88000 mg/m³/30 m	Eye(rabbit): 500 mg/24hr - Mild

■ The material may produce moderate eye irritation leading to inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

WARNING: This substance has been classified by the IARC as Group 2B: Possibly Carcinogenic to Humans.

Inhalation (human) TCLo: 500 ppm/ 1 y - I Eye(rabbit): 10 mg - mild

HEPTANE:

Inhalation (human) TCLo: 1000 ppm/6m	Nil Reported

CARBON DIOXIDE:

Inhalation (rat) LCLo: 657190 ppm/15 m

Inhalation (human) TCLo: 2000 ppm

Inhalation (human) LCLo: 9 pph/5 m (9%)

- pulmonary effects

IDLH: 50,000 ppm

REPROTOXIN

perchloroethylene	ILO Chemicals in the electronics industry that have toxic effects on reproduction	Reduced fertility or sterility
carbon dioxide	ILO Chemicals in the electronics industry that have toxic effects on reproduction	Reduced fertility or sterility

Section 12 - ECOLOGICAL INFORMATION

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Refer to data for ingredients, which follows:
HEPTANE:
PERCHLOROETHYLENE:
■ 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.
PERCHLOROETHYLENE:
METHYLENE CHLORIDE:
HEPTANE:
CRC (NZ) 5087 BRAKLEEN BLASTER AEROSOL:
■ DO NOT discharge into sewer or waterways.
HEPTANE:
CRC (NZ) 5087 BRAKLEEN BLASTER AEROSOL:
■ For n-heptane:
log Kow : 4.66
Koc : 2400-8100
Half-life (hr) air : 52.8
Half-life (hr) H2O surface water : 2.9-312
Henry's atm m3 /mol: 2.06
BOD 5 if unstated: 1.92
COD : 0.06
BCF : 340-2000
log BCF : 2.53-3.31
Environmental fate:
Photolysis or hydrolysis of n-heptane are not expected to be important environmental fate processes. Biodegradation of n-heptane may occur in soil and water, however volatilisation and adsorption are expected to be more important fate processes. A high Koc (2400-8200) indicates n-heptane will be slightly mobile to immobile in soil. In aquatic systems n-heptane may partition from the water column to organic matter in sediments and suspended solids. The bioconcentration of n-heptane may be important in aquatic environments. the Henry's Law constant suggests rapid volatilisation from environmental waters and surface soils. The volatilisation half-lives from a model river and a model pond (the latter considers the effect of adsorption) have been estimated to be 2.9 hr and 13 days, respectively.
n-Heptane is expected to exist entirely in the vapour phase in ambient air. Reactions with photochemically produced hydroxyl radicals in the atmosphere have been shown to be important (estimated half-life of 2.4 days calculated from its rate constant of 7.15x10-12 cu cm/molecule-sec at 25 deg C). Data also suggests that night-time reactions with nitrate radicals may contribute to the atmospheric transformation of n-heptane, especially in urban environments. n-Heptane does not contain chromophores that absorb at wavelengths >290 nm and therefore is not expected to be susceptible to direct photolysis by sunlight
An estimated BCF of 2,000 using log Kow suggests the potential for bioconcentration in aquatic organisms is very high. Based on 100% degradation after 4 days in water inoculated with gasoline contaminated soil and 100% degradation after 25 days in water inoculated with activated sewage sludge, biodegradation is expected to be an important fate process for n-heptane in water.
Ecotoxicity:
Fish LC50 (48 h): goldfish (Carrasius auratus) 4 mg/l; golden orfe (Idus melanotus) 2940 mg/l; western mosquitofish (Gambusia affinis) 4924 mg/l
Daphnia LC50 (24 h): >10 mg/l
Daphnia EC50 (96 h): 82 mg/l (immobilisation)
Opposum shrimp (Mysidopsis bahia) LC50 (96 h): 0.1 mg/l
Snail EC50 (96 h): 472 mg/l.
PERCHLOROETHYLENE:
CRC (NZ) 5087 BRAKLEEN BLASTER AEROSOL:
■ For tetrachloroethylene (syn: perchloroethylene)
log Koc : 2.38-2.97
Koc : 209-1685
Half-life (hr) H2O surface water : 26.4-2664
Henry's atm m3 /mol: 1.49E-02
BOD 5: 0.06
COD : 0.39
BCF : 38.9-226
Log BCF : 1.59
Environmental fate:
The predicted degradation half-life of tetrachloroethylene (perchloroethylene) in the atmosphere indicates that long-range global transport is likely. Indeed, monitoring data have demonstrated that tetrachloroethylene is present in the atmosphere worldwide and at locations far removed from anthropogenic emission sources. Dry deposition does not appear to be a significant removal process, although substantial evaporation from dry surfaces can be predicted from the high vapor pressure.
The dominant transformation process for tetrachloroethylene in the atmosphere is a reaction with photochemically produced hydroxyl radicals in the troposphere. The major reactions occur with hydroxyl radicals (half-life for reaction 3.2 months) and chlorine radicals (half-life for reaction 6-12 months). During the photochemical degradation of tetrachloroethylene a number of products may be formed including phosgene, trichloroacetyl chloride and carbon tetrachloride. Trichloroacetyl chloride can further react in the atmosphere to form trichloroacetic acid. Tetrachloroethylene has the potential to dissolve in atmospheric water droplets and be deposited by rainout.. The reaction of volatile chlorinated hydrocarbons with OH radicals is temperature dependent and is thus expected to proceed more rapidly in the summer months. The degradation products of this reaction include phosgene, chloroacetyl chlorides, formic acid, carbon monoxide, carbon tetrachloride, and hydrochloric acid. Reaction of tetrachloroethylene with ozone in the atmosphere is too slow to be an effective agent in tetrachloroethylene removal. The photochemical reactivity of tetrachloroethylene leading to the production of ambient ozone to be negligible.
Existing evidence indicates that tetrachloroethylene does not readily transform in water. Mass balance experiments in a sand aquifer showed that the amount of tetrachloroethylene recovered at the end of migration through the aquifer was essentially the same as that added. Studies of photolysis and hydrolysis demonstrated that photolysis did not contribute substantially to the transformation of tetrachloroethylene.
Chemical hydrolysis appeared to occur only at elevated temperature in a high pH (9.2) environment, and even then, at a very slow rate.
In natural waters, biodegradation may be the most important transformation process. Various biodegradation screening tests and laboratory studies have shown tetrachloroethylene to be resistant to biotransformation or biodegraded only slowly. Other screening studies have noted more rapid biodegradation; however, these studies used microbes that had to be adapted to tetrachloroethylene. Microbial degradation products of

tetrachloroethylene in groundwater have been reported. to include primarily trichloroethylene and small amounts of cis- and trans-dichloroethylene .
Tetrachloroethylene undergoes anaerobic biodegradation by a process of reductive dechlorination. The extent to which this occurs depends on the local conditions. Tetrachloroethylene does not appear to undergo aerobic biodegradation.
Biotransformation was strongly indicated as a factor in the degradation of tetrachloroethylene in a case of soil and groundwater pollution. Since neither biodegradation nor hydrolysis occurs at a rapid rate, most tetrachloroethylene present in surface waters can be expected to volatilise into the atmosphere. However, because tetrachloroethylene is denser than water and only slightly soluble in water, that which is not immediately volatilised may be expected to sink and thus be removed from contact with the surface. Volatilisation will therefore not be a viable process for this fraction of tetrachloroethylene, which may instead be rapidly transported into groundwater by leaching through fissures rather than matrix pores. The sinking of tetrachloroethylene into groundwater also makes cleanup difficult The amount of tetrachloroethylene adsorbed to soils is negligible; hence it is relatively mobile in groundwater in the absence of any removal process. Laboratory studies modeling soil systems have demonstrated that volatilisation rates for tetrachloroethylene from soil are much less than those from water. Volatilisation rates from soil, like water, appear to be related to surface-to-volume ratio. However, the authors of these studies also found a direct relationship between the concentration of the chemical in soil and rate of volatilisation, which contrasts with results seen in water, probably because concentration gradients are a more significant factor in soils than in uniformly mixed water. Soil type also influenced the volatilisation rate in this study, with the rate in a high organic carbon top soil greatly reduced compared to that of a low organic carbon, sandy loam. Contrasting results were seen in another study, which found that soil type had no effect on rate of volatilisation. However, this may simply be a reflection of the fact that the differences between soils used in this study, particularly organic carbon content, were not very great. Sorption of organic compounds to soil has been found to be most reliably predicted when related to the organic carbon content of the soil. Experimentally measured soil sorption coefficients based on organic carbon content (Koc) for tetrachloroethylene range from 177 to 534. These values are indicative of medium-to-high mobility in soil.
Biodegradation of tetrachloroethylene in soil appears to occur only under specific conditions, and then only to a limited degree.
Tetrachloroethylene has a low potential for bioaccumulation based upon measured levels in fish (BCF 10-100) and Log Kow of 2.53. These numbers are suggestive of a low tendency to bioconcentrate. Monitoring data on tetrachloroethylene concentrations in seawater and associated aquatic organisms are in agreement with the experimental BCF data. Highly fatty substances may adsorb tetrachloroethylene. Therefore foodstuffs exposed to atmospheric tetrachloroethylene may contain relatively high levels of tetrachloroethylene and be a route of indirect exposure of man via the environment. Concentrations of tetrachloroethylene (dry weight basis) detected in fish (eel, cod, coalfish, dogfish) from the relatively unpolluted Irish Sea ranged from below detection limits to 43 ppb. Biomagnification in the aquatic food chain does not appear to be important Bioaccumulation in plants may be indicated by the presence of tetrachloroethylene in fruits and vegetables
Ecotoxicity:
Fish LC50 (96 h): Jordanella floridae 8.4 mg/l; Oncorhyncus mykiss 5 mg/l
Daphnia magna EC50 (48 h): 8.5 mg/l; NOEC (28 d): 0.51 mg/l (reproduction)
Algae EC50 (72 h): Chlamydomonas reinhardii 3.64 mg/l
The most sensitive species in a chronic toxicity test is Daphnia magna with a 28 day NOEC based upon reproduction of 0.51 mg/l. Based upon this result and applying an assessment factor of 10 the PNEC aquatic is calculated as 51 ug/l for tetrachloroethylene. A PNECmicro-organisms of 11.2 mg/l is derived using a 24 hour IC50 of 112 mg/l for the nitrifying bacteria Nitrosomonas sp.
No toxicity data is available for benthic organisms, therefore the PNECsediment is derived by a partition coefficient method from the PNECaquatic. The PNECsediment is calculated as 318 ug/kg wet weight.
Short term and long term toxicity studies on terrestrial invertebrates, plant and soil dwelling bacteria are reported. A PNECterrestrial is calculated from these studies. The lowest long term toxicity test reported is a bacterial NOEC of .0.1 mg/kg (wet weight) for nitrification in a loam soil. Based upon this result and applying an assessment factor of 10 the PNECterrestrial is calculated as 0.01 mg/kg wet weight. For comparison, the equilibrium partitioning method gives a PNEC of 0.24 mg/kg wet weight.
The effects of tetrachloroethylene on plants exposed through the air have been studied. Twelve plant species were exposed in open top chambers, with exposure over a growing season. The species were selected to represent the range of European flora, and included crops (bean, wheat and kale), trees (spruce, pine and beech), wild species and mosses. Effects of some kind were seen in ten of the species used, with the bean (Phaseolus vulgaris) the species affected at the lowest concentration. Seasonal effects were noted, in that both bean plants and clover were affected by exposures during the spring but showed no effects in similar exposures during the summer. A number of approaches were used to determine a PNEC from the results of the study, with the value selected being 8.2 ug/m3.
Due to concern over the possible effects of the atmospheric breakdown products of tetrachloroethylene on the environment, toxicity of trichloroacetic acid is also considered in this assessment. The effects of trichloroacetic acid on aquatic organisms are considered in the OECD SIAR on trichloroacetic acid and used to derive PNECaquatic of 0.17 µg/l. The PNEC for trichloroacetic acid for terrestrial organisms is derived, from data given in the SIAR on trichloroacetic acid, as 2.4 µg/kg dry weight.
■ 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

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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.
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Marine Pollutant Yes

■ Substances containing unsaturated carbons are ubiquitous in indoor environments. They result from many sources (see below). Most are reactive with environmental ozone and many produce stable products which are thought to adversely affect human health.The potential for surfaces in an enclosed space to facilitate reactions should be considered.

Source of unsaturated substances	Unsaturated substances (Reactive Emissions)	Major Stable Products produced following reaction with ozone.
Occupants (exhaled breath, ski oils, personal care products)	Isoprene, nitric oxide, squalene, unsaturated sterols, oleic acid and other unsaturated fatty acids, unsaturated oxidation products	Methacrolein, methyl vinyl ketone, nitrogen dioxide, acetone, 6MHQ, geranyl acetone, 4OPA, formaldehyde, nonanol, decanal, 9-oxo-nonanoic acid, azelaic acid, nonanoic acid.
Soft woods, wood flooring, including cypress, cedar and silver fir boards, houseplants	Isoprene, limonene, alpha-pinene, other terpenes and sesquiterpenes	Formaldehyde, 4-AMC, pinoaldehyde, pinic acid, pinonic acid, formic acid, methacrolein, methyl vinyl ketone, SOAs including ultrafine particles
Carpets and carpet backing	4-Phenylcyclohexene, 4-vinylcyclohexene, styrene, 2-ethylhexyl acrylate, unsaturated fatty acids and esters	Formaldehyde, acetaldehyde, benzaldehyde, hexanal, nonanal, 2-nonenal
Linoleum and paints/polishes containing linseed oil	Linoleic acid, linolenic acid	Propanal, hexanal, nonanal, 2-heptenal, 2-nonenal, 2-decenal, 1-pentene-3-one, propionic acid, n-butyric acid
Latex paint	Residual monomers	Formaldehyde
Certain cleaning products, polishes, waxes, air fresheners	Limonene, alpha-pinene, terpinolene, alpha-terpineol, linalool, linalyl acetate and other terpenoids, longifolene and other sesquiterpenes	Formaldehyde, acetaldehyde, glycoaldehyde, formic acid, acetic acid, hydrogen and organic peroxides, acetone, benzaldehyde, 4-hydroxy-4-methyl-5-hexen-1-al, 5-ethenyl-dihydro-5-methyl-2(3H)-furanone, 4-AMC, SOAs including ultrafine particles
Natural rubber adhesive	Isoprene, terpenes	Formaldehyde, methacrolein, methyl vinyl ketone
Photocopier toner, printed paper, styrene polymers	Styrene	Formaldehyde, benzaldehyde
Environmental tobacco smoke	Styrene, acrolein, nicotine	Formaldehyde, benzaldehyde, hexanal, glyoxal, N-methylformamide, nicotinaldehyde, cotinine
Soiled clothing, fabrics, bedding	Squalene, unsaturated sterols, oleic acid and other saturated fatty acids	Acetone, geranyl acetone, 6MHO, 40PA, formaldehyde, nonanal, decanal, 9-oxo-nonanoic acid, azelaic acid, nonanoic acid
Soiled particle filters	Unsaturated fatty acids from plant waxes, leaf litter, and other vegetative debris; soot; diesel particles	Formaldehyde, nonanal, and other aldehydes; azelaic acid; nonanoic acid; 9-oxo-nonanoic acid and other oxo-acids; compounds with mixed functional groups (=O, -OH, and -COOH)
Ventilation ducts and duct liners	Unsaturated fatty acids and esters, unsaturated oils, neoprene	C5 to C10 aldehydes
"Urban grime"	Polycyclic aromatic hydrocarbons	Oxidized polycyclic aromatic hydrocarbons
Perfumes, colognes, essential oils (e.g. lavender, eucalyptus, tea tree)	Limonene, alpha-pinene, linalool, linalyl acetate, terpinene-4-ol, gamma-terpinene	Formaldehyde, 4-AMC, acetone, 4-hydroxy-4-methyl-5-hexen-1-al, 5-ethenyl-dihydro-5-methyl-2(3H) furanone, SOAs including ultrafine particles
Overall home emissions	Limonene, alpha-pinene, styrene	Formaldehyde, 4-AMC, pinonaldehyde, acetone, pinic acid, pinonic acid, formic acid, benzaldehyde, SOAs including ultrafine particles

Abbreviations: 4-AMC, 4-acetyl-1-methylcyclohexene; 6MHQ, 6-methyl-5-heptene-2-one, 4OPA, 4-oxopentanal, SOA, Secondary Organic Aerosols
Reference: Charles J Weschler; Environmental Helath Perspectives, Vol 114, October 2006.
PERCHLOROETHYLENE:

Marine Pollutant	Yes
Fish LC50 (96hr.) (mg/l):	18.4-21.4
log Pow (Verschueren 1983):	2.6
BOD5:	0.06
ThOD:	0.39

■ Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

CRC (NZ) 5087 Brakleen Blaster Aerosol

Hazard Alert Code: HIGH

(Chemwatch name: CRC (NZ) 5087 BRAKLEEN BLASTER AEROSOL)

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METHYLENE CHLORIDE:

Fish LC50 (96hr.) (mg/l):	147.6-193
Daphnia magna EC50 (48hr.) (mg/l):	224
BCF<100:	5
log Kow (Prager 1995):	1.25
Half-life Soil - High (hours):	672
Half-life Soil - Low (hours):	168
Half-life Air - High (hours):	4584
Half-life Air - Low (hours):	458
Half-life Surface water - High (hours):	672
Half-life Surface water - Low (hours):	168
Half-life Ground water - High (hours):	1344
Half-life Ground water - Low (hours):	336
Aqueous biodegradation - Aerobic - High (hours):	672
Aqueous biodegradation - Aerobic - Low (hours):	168
Aqueous biodegradation - Anaerobic - High (hours):	2688
Aqueous biodegradation - Anaerobic - Low (hours):	672
Aqueous biodegradation - Removal secondary treatment - High (hours):	94.50%
Photolysis maximum light absorption - High (nano-m):	250
Photolysis maximum light absorption - Low (nano-m):	220
Photooxidation half-life air - High (hours):	4584
Photooxidation half-life air - Low (hours):	458
First order hydrolysis half-life (hours):	704 YR

■ For methylene chloride:
log Kow: 1.25
log Koc: 1.68
log Kom: 1.44
Henry's atm m3 /mol: 2.68E-03
BCF: 5
Environmental fate:

Methylene chloride is a volatile liquid,and tends to volatilise to the atmosphere from water and soil. The half-life of methylene chloride volatilisation from water has been found to be 21 minutes under experimental conditions but actual volatilisation from natural waters will depend on the rate of mixing, wind speed, temperature, and other factors. The Henry's law constant value (H) of 0.002 atm/m3/mol indicates that methylene chloride will volatilise rapidly from moist soil and water surfaces.

Methylene chloride is not strongly sorbed to soils or sediments Based on its low soil organic carbon partitioning coefficient (Koc) of 25, methylene chloride is likely to be very highly mobile in soils and may be expected to leach from soils into groundwater.

Based on a reported log octanol/water partition coefficient (Kow) of 1.3 an estimated bioconcentration factor (BCF) of 2.3 was derived. There is no evidence of biomagnification, but because the estimated BCF is low, significant biomagnification of methylene chloride in aquatic food chains is not expected.

Air: The main degradation pathway for methylene chloride in air is its reaction with photochemically generated hydroxyl radicals. Thus, the atmospheric lifetime of methylene chloride may be predicted from the hydroxyl radical concentration in air and the rate of reaction. Most reported rates for hydroxyl radical reaction with methylene chloride range from 1.0 x10-13 to 1.5 x10-13 cm3/mol/sec, and estimates of average atmospheric hydroxyl radical concentration range from 2.5 x10+5 to 1x10+6 mol/cm3 Using this information, an average atmospheric lifetime for methylene chloride may be calculated to be 130 days. Because this degradation pathway is relatively slow, methylene chloride may become widely dispersed but is not likely to accumulate in the atmosphere. The small amount of methylene chloride which reaches the stratosphere (about 1%) may undergo direct photolytic degradation; however, photolysis in the troposphere is not expected. Reactions of methylene chloride with ozone or other common atmospheric species (e.g., oxygen atoms, chlorine atoms, and nitrate radicals) are not believed to contribute to its breakdown.

Water: Methylene chloride undergoes slow hydrolysis in water. The experimental half-life reported for the hydrolysis reaction, at neutral conditions, is approximately 18 months at 25 C .

However, the rate of reaction varies greatly with changes in temperature and pH. A hydrolytic half-life of 14 days was reported for methylene chloride in acidic solutions at 80-150 C. This experimental value, when extrapolated to 25 C, is about 700 years. Different mechanisms of hydrolyses may be responsible for these two widely different values.

Both aerobic and anaerobic biodegradation may be an important fate process for methylene chloride in water. Methylene chloride has been

observed to undergo degradation at a rapid rate under aerobic conditions. Reported total methylene chloride loss was 100% after 7 days in a static culture flask biodegradability screening test.
Sediment and Soil: The rate of biodegradation was found to be dependent on soil type, substrate concentration, and redox state of the soil. Methylene chloride biodegradation has been reported to occur under both aerobic conditions and anaerobic conditions. The biodegradation of methylene chloride appears to be accelerated by the presence of elevated levels of organic carbon.
Methylene chloride has a low tendency to absorb to soil; therefore, there is a potential for leaching to groundwater. Also, because of the high vapor pressure, volatilisation to air is also a likely fate process from dry soil. Its high Henry's law constant (0.002 atm/m3/mol) indicates that volatilization from moist soil is also likely.
■ The UK Department of Environment have established that methylene chloride is not a greenhouse gas and the Organisation for Economic Cooperation and Development (OECD) in a Monograph have affirmed that there was no single international view that risk reduction measures are required for the solvent. The Monograph suggests that alternatives may pose a greater risk to the environment.
In the atmosphere methylene chloride degrades by reaction with photochemically produced hydroxy radicals (half-life 6 months). Methylene chloride rapidly volatilises from water and soil to the atmosphere (estimated half-life for volatilisation from water 3-5.6 hours). In soil methylene chloride may partially leach to ground water. It is not expected to bioaccumulate or bioconcentrate in the food chain.
Drinking Water Standards:
hydrocarbon total: 10 ug/l (UK max)
dichloromethane: 20 ug/l (WHO guideline)
Soil Guidelines: Dutch Criteria: detection threshold (target)
20 mg/kg (intervention)
Air Quality Standards:
3 mg/m3 averaging time 24 hours (WHO guideline).
HEPTANE:

Marine Pollutant	Yes
Fish LC50 (96hr.) (mg/l):	4924
log Kow (Sangster 1997):	4.66
BOD5:	1.92
COD:	0.06

■ Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
CARBON DIOXIDE:

log Kow (Sangster 1997):	0.83

■ For carbon dioxide:
Environmental fate:
Carbon dioxide in earth's atmosphere is considered a trace gas currently occurring at an average concentration of about 385 parts per million by volume or 582 parts per million by mass. The mass of the Earth atmosphere is 5.14×10+18 kg , so the total mass of atmospheric carbon dioxide is 3.0×10+15 kg (3,000 gigatonnes). Atmospheric concentrations of carbon dioxide fluctuate slightly with the change of the seasons, driven primarily by seasonal plant growth .
Due to human activities such as the combustion of fossil fuels and deforestation, the concentration of atmospheric carbon dioxide has increased by about 35% since preindustrial times. In 1999, 2,244,804,000 (=~2.2 x10+9) metric tons of CO2 were produced in the U.S. as a result of electric energy generation. This is an output rate of 0.6083 kg (1.341 pounds) per kWh.
There is about 50 times as much carbon dissolved in the oceans in the form of CO2 and CO2 hydration products as exists in the atmosphere. The oceans act as an enormous carbon sink, having "absorbed about one-third of all human-generated CO2 emissions to date." Generally, gas solubility decreases as water temperature increases. Accordingly the ability of the oceans to absorb carbon dioxide from the atmosphere decreases as ocean temperatures rise.
Carbon dioxide is soluble in water, in which it spontaneously interconverts between CO2 and H2CO3 (carbonic acid). The relative concentrations of CO2, H2CO3, and the deprotonated forms HCO3 - (bicarbonate) and CO3 2-(carbonate) depend on the pH. In neutral or slightly alkaline water (pH > 6.5), the bicarbonate form predominates (>50%) becoming the most prevalent (>95%) at the pH of seawater, while in very alkaline water (pH > 10.4) the predominant (>50%) form is carbonate. The bicarbonate and carbonate forms are very soluble, such that air-equilibrated ocean water (mildly alkaline with typical pH = 8.2 - 8.5) contains about 120 mg of bicarbonate per liter.
Most of the CO2 taken up by the ocean forms carbonic acid. Some is consumed in photosynthesis by organisms in the water, and a small proportion of that sinks and leaves the carbon cycle. There is considerable concern that as a result of increased CO2 in the atmosphere the acidity of seawater has been increasing and may adversely affect organisms living in the water. In particular, with increasing acidity, the availability of carbonates for forming shells decreases.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
perchloroethylene	HIGH	HIGH	LOW	MED
methylene chloride	LOW	HIGH	LOW	HIGH
heptane	HIGH		HIGH	MED
carbon dioxide	LOW		LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

■ 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 or process equipment to enter drains.
- It may be necessary to collect all wash water for treatment before disposal.
- In all cases disposal to sewer may be subject to local laws and regulations and these should be considered first.
- Where in doubt contact the responsible authority.
- Consult State Land Waste Management Authority for disposal.
- Discharge contents of damaged aerosol cans at an approved site.
- Allow small quantities to evaporate.
- DO NOT incinerate or puncture aerosol cans.
- Bury residues and emptied aerosol cans at an approved site.

Section 14 - TRANSPORTATION INFORMATION

Labels Required: FLAMMABLE GAS

HAZCHEM:

(1) Not applicable to the carriage of dangerous goods under RID or ADR
Land Transport UNDG:

Class or division	2.1	Subsidiary risk:	None
UN No.:	1950	UN packing group:	None

Shipping Name:AEROSOLS

Air Transport IATA:

UN/ID Number:	1950	Packing Group:	-
Special provisions:	A145		

Shipping Name: AEROSOLS, FLAMMABLE

Maritime Transport IMDG:

IMDG Class:	2	IMDG Subrisk:	SP63
UN Number:	1950	Packing Group:	None
EMS Number:	F-D,S-U	Special provisions:	63 190 277 327 344 959
Limited Quantities:	See SP277	Marine Pollutant:	Yes

Shipping Name: AEROSOLS

Section 15 - REGULATORY INFORMATION

REGULATIONS

Regulations for ingredients

perchloroethylene (CAS: 127-18-4) is found on the following regulatory lists;

"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","International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Chemicals (single components)","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Scheduled Toxic Substances","New Zealand Inventory of Chemicals (NZIoC)","New Zealand Workplace Exposure Standards (WES)","WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water"

methylene chloride (CAS: 75-09-2) is found on the following regulatory lists;

"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","International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs","International Council of Chemical Associations (ICCA) - High Production Volume List","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Chemicals (single components)","New Zealand Hazardous Substances and New Organisms

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(HSNO) Act - Classification of Chemicals","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals - Classification Data","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Pesticides","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Scheduled Toxic Substances","New Zealand Inventory of Chemicals (NZIoC)","New Zealand Workplace Exposure Standards (WES)","WHO Guidelines for Drinking-water Quality - Guideline values for chemicals that are of health significance in drinking-water"

heptane (CAS: 142-82-5,31394-54-4) is found on the following regulatory lists;

"IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances","New Zealand Workplace Exposure Standards (WES)"

carbon dioxide (CAS: 124-38-9) is found on the following regulatory lists;

"CODEX General Standard for Food Additives (GSFA) - Additives Permitted for Use in Food in General, Unless Otherwise Specified, in Accordance with GMP","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Classification of Chemicals","New Zealand Hazardous Substances and New Organisms (HSNO) Act - Dangerous Goods","New Zealand Inventory of Chemicals (NZIoC)","New Zealand Workplace Exposure Standards (WES)"

No data for CRC (NZ) 5087 Brakleen Blaster Aerosol (CW: 21-8162)

Specific advice on controls required for materials used in New Zealand can be found at
http://www.ermanz.govt.nz/search/registers.html

Section 16 - OTHER INFORMATION

NEW ZEALAND POISONS INFORMATION CENTRE
0800 POISON (0800 764 766)
NZ EMERGENCY SERVICES: 111

Ingredients with multiple CAS Nos

Ingredient Name	CAS
heptane	142-82-5, 31394-54-4

REPRODUCTIVE HEALTH GUIDELINES

■ Established occupational exposure limits frequently do not take into consideration reproductive end points that are clearly below the thresholds for other toxic effects. Occupational reproductive guidelines (ORGs) have been suggested as an additional standard. These have been established after a literature search for reproductive no-observed-adverse effect-level (NOAEL) and the lowest-observed-adverse-effect-level (LOAEL). In addition the US EPA's procedures for risk assessment for hazard identification and dose-response assessment as applied by NIOSH were used in the creation of such limits. Uncertainty factors (UFs) have also been incorporated.

Ingredient	ORG	UF	Endpoint	CR	Adeq TLV
perchloroethylene	11.87 mg/m3	100	R	20	-
methylene chloride	2.4 mg/m3	100	R	14	-
carbon dioxide	1800 mg/m3	10	D/R	NA	-

■ These exposure guidelines have been derived from a screening level of risk assessment and should not be construed as unequivocally safe limits. ORGS represent an 8-hour time-weighted average unless specified otherwise.
CR = Cancer Risk/10000; UF = Uncertainty factor:
TLV believed to be adequate to protect reproductive health:
LOD: Limit of detection
Toxic endpoints have also been identified as:
D = Developmental; R = Reproductive; TC = Transplacental carcinogen
Jankovic J., Drake F.: A Screening Method for Occupational Reproductive
American Industrial Hygiene Association Journal 57: 641-649 (1996).

■ Classification of the preparation 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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