Right to Know

Hazardous Substance Fact Sheet

Common Name: TRICHLOROETHYLENE

Synonyms: Ethylene Trichloride; TCE; Trichloroethene
Chemical Name: Ethene, Trichloro-
Date: January 2000 Revision: December 2008

Description and Use

Trichloroethylene is a clear, colorless liquid with a sweet odor. It is used as a degreaser for metal parts, as a solvent and fumigant, and to make other chemicals.

- ODOR THRESHOLD = 1.4 ppm
- Odor thresholds vary greatly. Do not rely on odor alone to determine potentially hazardous exposures.

Reasons for Citation

- Trichloroethylene is on the Right to Know Hazardous Substance List because it is cited by OSHA, ACGIH, DOT, NIOSH, NTP, DEP, IARC, IRIS, NFPA and EPA.
- This chemical is on the Special Health Hazard Substance List.

SEE GLOSSARY ON PAGE 5.

FIRST AID

Eye Contact
- Immediately flush with large amounts of water for at least 15 minutes, lifting upper and lower lids. Remove contact lenses, if worn, while flushing. Seek medical attention.

Skin Contact
- Quickly remove contaminated clothing. Immediately wash contaminated skin with large amounts of soap and water. Seek medical attention.

Inhalation
- Remove the person from exposure.
- Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
- Transfer promptly to a medical facility.

EMERGENCY NUMBERS

Poison Control: 1-800-222-1222
CHEMTREC: 1-800-424-9300
NJDEP Hotline: 1-877-927-6337
National Response Center: 1-800-424-8802

EMERGENCY RESPONDERS >>>> SEE BACK PAGE

Hazard Summary

<table>
<thead>
<tr>
<th>Hazard Rating</th>
<th>NJDOH</th>
<th>NFPA</th>
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<tbody>
<tr>
<td>HEALTH</td>
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<td>2</td>
</tr>
<tr>
<td>FLAMMABILITY</td>
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<td>1</td>
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<tr>
<td>REACTIVITY</td>
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</tr>
</tbody>
</table>

POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

- Trichloroethylene can affect you when inhaled and by passing through the skin.
- Trichloroethylene should be handled as a CARCINOGEN--WITH EXTREME CAUTION.
- Contact can irritate and burn the skin and eyes with possible eye damage.
- Exposure can cause headache, dizziness, lightheadedness, and passing out. Very high exposure can cause irregular heartbeat, which can be fatal.
- Trichloroethylene may cause a skin allergy.
- Repeated exposure may cause personality changes such as depression, anxiety or irritability.
- Trichloroethylene may damage the liver and kidneys.

Workplace Exposure Limits

OSHA: The legal airborne permissible exposure limit (PEL) is 100 ppm averaged over an 8-hour workshift, and 200 ppm, not to be exceeded during any 15-minute work period, and 300 ppm as a 5-minute peak in any 2-hour work period.

NIOSH: Recommends that exposure to occupational carcinogens be limited to the lowest feasible concentration.

ACGIH: The threshold limit value (TLV) is 10 ppm averaged over an 8-hour workshift and 25 ppm as a STEL (short-term exposure limit).

- Trichloroethylene is a PROBABLE CARCINOGEN in humans. There may be no safe level of exposure to a carcinogen, so all contact should be reduced to the lowest possible level.
- The above exposure limits are for air levels only. When skin contact also occurs, you may be overexposed, even though air levels are less than the limits listed above.
Determining Your Exposure

- Read the product manufacturer’s Material Safety Data Sheet (MSDS) and the label to determine product ingredients and important safety and health information about the product mixture.
- For each individual hazardous ingredient, read the New Jersey Department of Health Hazardous Substance Fact Sheet, available on the RTK website (www.nj.gov/health/eoh/rtkweb) or in your facility’s RTK Central File or Hazard Communication Standard file.
- You have a right to this information under the New Jersey Worker and Community Right to Know Act, the Public Employees Occupational Safety and Health (PEOSH) Act if you are a public worker in New Jersey, and under the federal Occupational Safety and Health Act (OSHA) if you are a private worker.
- The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard (29 CFR 1910.1200) and the PEOSH Hazard Communication Standard (N.J.A.C. 12:100-7) require employers to provide similar information and training to their employees.

This Fact Sheet is a summary of available information regarding the health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

Health Hazard Information

Acute Health Effects
The following acute (short-term) health effects may occur immediately or shortly after exposure to Trichloroethylene:

- Contact can irritate and burn the skin and eyes with possible eye damage.
- Exposure can cause headache, dizziness, lightheadedness, visual disturbances, nausea and vomiting, and passing out. Very high exposure can cause irregular heartbeat, which can be fatal.

Chronic Health Effects
The following chronic (long-term) health effects can occur at some time after exposure to Trichloroethylene and can last for months or years:

Cancer Hazard
- Trichloroethylene is a PROBABLE CARCINOGEN in humans. There is evidence that it causes liver, kidney, and lung cancer in animals.
- Many scientists believe there is no safe level of exposure to a carcinogen.

Reproductive Hazard
- There is limited evidence that Trichloroethylene is a teratogen in animals. Until further testing has been done, it should be treated as a possible teratogen in humans.
- There is limited evidence that Trichloroethylene may affect fertility and may damage the male reproductive system (including decreasing the sperm count) in animals.

Other Effects
- Trichloroethylene may cause a skin allergy. If allergy develops, very low future exposure can cause itching and a skin rash.
- Repeated exposure may cause personality changes such as depression, anxiety or irritability, and memory loss.
- Trichloroethylene may damage the liver and kidneys.

Medical

Medical Testing
For frequent or potentially high exposure (half the TLV or greater, or significant skin contact) the following are recommended before beginning work and at regular times after that:

- Liver and kidney function tests

If symptoms develop or overexposure is suspected, the following are recommended:

- Exam of the nervous system
- Evaluation by a qualified allergist can help diagnose skin allergy.
- Urinary Trichloroacetic Acid level (for repeated exposures) or blood Trichloroethylene levels (for acute exposure)
- Special 24-48 hour EKG (Holter monitor) to observe and record abnormal heart rhythms

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under the OSHA Access to Employee Exposure and Medical Records Standard (29 CFR 1910.1020).

Mixed Exposures
- More than light alcohol consumption can cause liver damage. Drinking alcohol can increase the liver damage caused by Trichloroethylene.
**Workplace Controls and Practices**

Very toxic chemicals, or those that are reproductive hazards or sensitizers, require expert advice on control measures if a less toxic chemical cannot be substituted. Control measures include: (1) enclosing chemical processes for severely irritating and corrosive chemicals, (2) using local exhaust ventilation for chemicals that may be harmful with a single exposure, and (3) using general ventilation to control exposures to skin and eye irritants. For further information on workplace controls, consult the NIOSH document on Control Banding at [www.cdc.gov/niosh/topics/ctrlbanding/](http://www.cdc.gov/niosh/topics/ctrlbanding/).

The following work practices are also recommended:

- Label process containers.
- Provide employees with hazard information and training.
- Monitor airborne chemical concentrations.
- Use engineering controls if concentrations exceed recommended exposure levels.
- Provide eye wash fountains and emergency showers.
- Wash or shower if skin comes in contact with a hazardous material.
- Always wash at the end of the workshift.
- Change into clean clothing if clothing becomes contaminated.
- Do not take contaminated clothing home.
- Get special training to wash contaminated clothing.
- Do not eat, smoke, or drink in areas where chemicals are being handled, processed or stored.
- Wash hands carefully before eating, smoking, drinking, applying cosmetics or using the toilet.

In addition, the following may be useful or required:

- Where possible, transfer Trichloroethylene from drums or other containers to process containers in an enclosed system.

**Personal Protective Equipment**

The OSHA Personal Protective Equipment Standard (29 CFR 1910.132) requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

**Gloves and Clothing**

- Avoid skin contact with Trichloroethylene. Wear personal protective equipment made from material which can not be permeated or degraded by this substance. Safety equipment suppliers and manufacturers can provide recommendations on the most protective glove and clothing material for your operation.
- Safety equipment manufacturers recommend Silver Shield®/4H®, Viton and Barrier® for gloves, and Tychem® F, BR, LV, Responder®, and TK; Zytron® 500; ONESuit® TEC; and Trellchem® HPS and VPS, or the equivalent, as protective materials for clothing.
- All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.

**Eye Protection**

- Wear indirect-vent, impact and splash resistant goggles when working with liquids.
- Wear non-vented, impact resistant goggles when working with fumes, gases, or vapors.
- Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.

**Respiratory Protection**

**Improper use of respirators is dangerous.** Respirators should only be used if the employer has implemented a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing, and medical exams, as described in the OSHA Respiratory Protection Standard (29 CFR 1910.134).

- Where the potential exists for exposure over 10 ppm, use a NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
- Exposure to 1,000 ppm is immediately dangerous to life and health. If the possibility of exposure above 1,000 ppm exists, use a NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode equipped with an emergency escape air cylinder.

**Fire Hazards**

If employees are expected to fight fires, they must be trained and equipped as stated in the OSHA Fire Brigades Standard (29 CFR 1910.156).

- Trichloroethylene may burn, but does not readily ignite.
- Use dry chemical, CO₂, water spray or alcohol-resistant foam as extinguishing agents.
- POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride and Phosgene.
- CONTAINERS MAY EXPLODE IN FIRE.
- Use water spray to keep fire-exposed containers cool.
- Use water spray to reduce vapors.
- Trichloroethylene accumulates static charge.
Spills and Emergencies

If employees are required to clean-up spills, they must be properly trained and equipped. The OSHA Hazardous Waste Operations and Emergency Response Standard (29 CFR 1910.120) may apply.

If Trichloroethylene is spilled or leaked, take the following steps:

- Evacuate personnel and secure and control entrance to the area.
- Eliminate all ignition sources.
- Absorb liquids in vermiculite, dry sand, earth, fly ash or cement powder and place into sealed containers for disposal.
- Use water spray to keep containers cool.
- Ventilate and wash area after clean-up is complete.
- DO NOT wash into sewer.
- It may be necessary to contain and dispose of Trichloroethylene as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.

Handling and Storage

Prior to working with Trichloroethylene you should be trained on its proper handling and storage.

- Trichloroethylene will react explosively with finely divided or powdered BARIUM, BERYLLIUM, and MAGNESIUM.
- Trichloroethylene reacts with ACTIVE METALS (such as LITHIUM, SODIUM and TITANIUM) to cause flashing and sparks and will react with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and EPOXIDES to form spontaneously flammable Dichloroacetylene.
- Trichloroethylene is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ISOCYANATES; EPICHLOROHYDRIN; ALCOHOLS; and GLYCOLS.
- Store in tightly closed containers in a cool, well-ventilated area away from COMBUSTIBLES, LIGHT and MOISTURE.
- Use only non-sparking tools and equipment, especially when opening and closing containers of Trichloroethylene.
- Metal containers involving the transfer of Trichloroethylene should be grounded and bonded as Trichloroethylene accumulates static charge.
GLOSSARY

ACGIH is the American Conference of Governmental Industrial Hygienists. They publish guidelines called Threshold Limit Values (TLVs) for exposure to workplace chemicals.

Acute Exposure Guideline Levels (AEGLs) are established by the EPA. They describe the risk to humans resulting from once-in-a lifetime, or rare, exposure to airborne chemicals.

Boiling point is the temperature at which a substance can change its physical state from a liquid to a gas.

A carcinogen is a substance that causes cancer.

The CAS number is unique, identifying number, assigned by the Chemical Abstracts Service, to a specific chemical.

CFR is the Code of Federal Regulations, which are the regulations of the United States government.

A combustible substance is a solid, liquid or gas that will burn.

A corrosive substance is a gas, liquid or solid that causes destruction of human skin or severe corrosion of containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

ERG is the Emergency Response Guidebook. It is a guide for emergency responders for transportation emergencies involving hazardous substances.

Emergency Response Planning Guideline (ERPG) values provide estimates of concentration ranges where one reasonably might anticipate observing adverse effects.

A fetus is an unborn human or animal.

A flammable substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The flash point is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

IARC is the International Agency for Research on Cancer, a scientific group.

Ionization Potential is the amount of energy needed to remove an electron from an atom or molecule. It is measured in electron volts.

IRIS is the Integrated Risk Information System database on human health effects that may result from exposure to various chemicals, maintained by federal EPA.

LEL or Lower Explosive Limit, is the lowest concentration of a combustible substance (gas or vapor) in the air capable of continuing an explosion.

mg/m³ means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

A mutagen is a substance that causes mutations. A mutation is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the federal Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the New Jersey Public Employees Occupational Safety and Health Act, which adopts and enforces health and safety standards in public workplaces.

Permeated is the movement of chemicals through protective materials.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

Protective Action Criteria (PAC) are values established by the Department of Energy and are based on AEGLs and ERPGs. They are used for emergency planning of chemical release events.

A reactive substance is a solid, liquid or gas that releases energy under certain conditions.

STEL is a Short Term Exposure Limit which is usually a 15-minute exposure that should not be exceeded at any time during a work day.

A teratogen is a substance that causes birth defects by damaging the fetus.

UEL or Upper Explosive Limit is the highest concentration in air above which there is too much fuel (gas or vapor) to begin a reaction or explosion.

Vapor Density is the ratio of the weight of a given volume of one gas to the weight of another (usually Hydrogen), at the same temperature and pressure.

The vapor pressure is a force exerted by the vapor in equilibrium with the solid or liquid phase of the same substance. The higher the vapor pressure the higher concentration of the substance in air.
Common Name: **TRICHLOROETHYLENE**

Synonyms: Ethylene Trichloride; TCE; Trichloroethene

CAS No: 79-01-6  
Molecular Formula: C₂HCl₃  
RTK Substance No: 1890

Description: Clear, colorless liquid with a sweet, Chloroform-like odor

### HAZARD DATA

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<th>Hazard Rating</th>
<th>Firefighting</th>
<th>Reactivity</th>
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<tr>
<td>3 - Health</td>
<td>Trichloroethylene may burn, but does not readily ignite. Use dry chemical, CO₂, water spray or alcohol-resistant foam as extinguishing agents. POISONOUS GASES ARE PRODUCED IN FIRE, including Hydrogen Chloride and Phosgene. CONTAINERS MAY EXPLODE IN FIRE. Use water spray to keep fire-exposed containers cool. Use water spray to reduce vapors. Trichloroethylene accumulates static charge.</td>
<td>Trichloroethylene will react explosively with finely divided or powdered BARIUM, BERYLLIUM, and MAGNESIUM. Trichloroethylene reacts with ACTIVE METALS (such as LITHIUM, SODIUM and TITANIUM) to cause flashing and sparks. Trichloroethylene will react with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE) and EPOXIDES to form spontaneously flammable Dichloroacetylene. Trichloroethylene is not compatible with STRONG ACIDS (such as HYDROCHLORIC, SULFURIC and NITRIC); ISOCYANATES; EPICHLOROHYDRIN; ALCOHOLS; and GLYCOLS.</td>
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<tr>
<td>1 - Fire</td>
<td></td>
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<tr>
<td>0 - Reactivity</td>
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**DOT#: UN 1710**  
**ERG Guide #: 160**  
**Hazard Class: 6.1 (Poison)**

### SPILL/LEAKS

**Isolation Distance:**
- Spill: 50 meters (150 feet)
- Fire: 800 meters (1/2 mile)

Absorb liquids in vermiculite, dry sand, earth, fly ash or cement powder and place into sealed containers for disposal. DO NOT wash into sewer.

Metal containers should be grounded and bonded as Trichloroethylene accumulates static charge. Trichloroethylene is slightly toxic to aquatic life.

### PHYSICAL PROPERTIES

- **Odor Threshold:** 1.4 ppm
- **Flash Point:** >200°F (93°C)
- **LEL:** 8%
- **UEL:** 10.5%
- **Auto Ignition Temp:** 788°F (420°C)
- **Vapor Density:** 4.5 (air = 1)
- **Vapor Pressure:** 58 mm Hg at 68°F (20°C)
- **Specific Gravity:** 1.5 (water = 1)
- **Water Solubility:** Slightly soluble
- **Boiling Point:** 189°F (87°C)
- **Melting Point:** -99°F (-73°C)
- **Ionization Potential:** 9.5 eV
- **Molecular Weight:** 131.4

### EXPOSURE LIMITS

- **ACGIH:** 10 ppm, 8-hr TWA; 25 ppm, 15-min STEL
- **IDLH:** 1,000 ppm

The Protective Action Criteria values are:
- PAC-1 = 130 ppm
- PAC-2 = 450 ppm
- PAC-3 = 3,800 ppm

### HEALTH EFFECTS

<table>
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<tr>
<th>Eyes</th>
<th>Skin</th>
<th>Inhalation</th>
<th>Chronic</th>
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<tr>
<td>Irritation and burns</td>
<td>Irritation and burns</td>
<td>Headache, dizziness, lightheadedness, visual disturbances, nausea and vomiting, and passing out</td>
<td>Cancer (liver, kidney, and lung) in animals</td>
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</tbody>
</table>

### FIRST AID AND DECONTAMINATION

- **Remove** the person from exposure.
- **Flush** eyes with large amounts of water for at least 15 minutes. Remove contact lenses if worn. Seek medical attention.
- **Quickly** remove contaminated clothing and wash contaminated skin with large amounts of soap and water. Seek medical attention.
- **Begin** artificial respiration if breathing has stopped and CPR if necessary.
- **Transfer** promptly to a medical facility.

### PROTECTIVE EQUIPMENT

- **Gloves:** Silver Shield®/4H®, Viton and Barrier® (>8-hr breakthrough)
- **Coveralls:** Tychem® F, BR, LV, Responder®, and TK; Zytron® 500; ONESuit® TEC; and Trellichem® HPS and VPS (>8-hr breakthrough)
- **Respirator:** >10 ppm - Supplied air or SCBA

December 2008