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Fact Sheet	
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1,1,1-Trichloroethane (TCA)

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Health Hazard Summary: *1,1,1-Trichloroethane (TCA) most commonly affects the nervous system, causing headaches, nausea, dizziness, drowsiness, and symptoms similar to drunkenness. TCA can also irritate the eyes, nose, and skin.*

HOW TO FIND OUT IF YOU WORK WITH TRICHLOROETHANE

Uses: TCA is a widely used industrial solvent. Some of its most common uses are as a:

- degreaser and cleaner for metals, plastics, silicon chips, other electronic parts, etc.

- drycleaner and spot remover
- propellant in aerosol cans
- quick-drying agent (for example, in typewriter correction fluid)

Odor and Appearance: TCA looks like water and has a mild sweet odor like the odor of chloroform or ether. TCA vapor is heavier than air, so it can collect in very high concentrations in pits, tanks, or other low spots.

Other Names: TCA is often called methyl chloroform (MC). Sometimes it is called TCE, although "TCE" usually refers to trichloro*ethylene*, a different chemical. TCA's trade names include Aerothene,[R] Chlorothene,[R] Inhibisol,[R] and many others. TCA belongs to a group of organic solvent chemicals called chlorinated hydrocarbons.

Your Right to Know: Under California's Hazard Communication Standard (*GISO 5194*), your employer must tell you if you are working with any hazardous substances, including TCA, and must train you to use them safely. If you think you may be exposed to hazardous chemicals at work, ask to see the Material Safety Data Sheets (MSDSs) for the products you are using.

An MSDS lists the hazardous chemical contents of a product, describes its health and safety hazards, and gives methods for its safe use, storage, and disposal. An MSDS should also include information on fire and explosion hazards, reactivity, first aid, and procedures for handling leaks and spills. Your employer is required to have an MSDS for any workplace product that contains a hazardous substance, and must make the MSDS available to employees upon request.

This Fact Sheet is an aid for worker training programs. It does not take the place of a Material Safety Data Sheet.

HOW TRICHLOROETHANE CAN ENTER AND AFFECT YOUR BODY

TCA enters your body when you breathe its vapors in the air. Small amounts of the liquid can also be absorbed through your skin, especially with lengthy skin contact. Overexposure to TCA most commonly affects your eyes and skin or your nervous system, as described below.

Eyes, Nose, and Throat: TCA in the air at levels above 350 ppm (see "Legal Exposure Limits," page 3) can cause teary eyes, sore throat, nasal irritation, and coughing. Liquid TCA splashed in your eye may cause immediate stinging of the eye, but any damage is usually repaired within a few days, as long as the eye is thoroughly washed out with water. TCA does not have long-term effects on the eyes, nose, throat, or lungs.

Skin: TCA, like other organic solvents, can dissolve your skin's natural protective oils. Frequent or lengthy skin contact with TCA can cause dryness, redness, flaking, cracking, and dermatitis (skin rash).

Nervous System: TCA, like other organic solvents, affects your central nervous system (your brain) the same way alcohol does.

Effects of Overexposure to Trichloroethane on the Nervous System

Mild	Moderate	Overexposure
headache	dizziness	weakness
nausea	giddiness	irritability
	feeling "high"	

Severe Overexposure	
confusion	clumsiness
slurredspeech	loss of balance

These effects disappear rapidly after your exposure stops. However, while you are affected you may be more likely to have accidents.

Very high exposure levels (above about 10,000 ppm) can cause disorientation, fainting, and even death.

Some studies suggest that frequent, repeated overexposure to organic solvents over months or years may have long-lasting and possibly permanent effects on the nervous system. The symptoms of these long-term effects include fatigue, impaired coordination, difficulty concentrating, loss of memory, and personality changes such as increased anxiety, nervousness, and irritability. The exposure levels at which these effects occur are not known, and the effects have not been studied in workers exposed specifically to TCA.

Heart: At extremely high exposure levels (above perhaps 10,000 ppm), TCA can cause sudden death. You could experience warning symptoms such as palpitations ("skipped beats") or sudden, extreme dizziness. However, there is no evidence that chronic low or moderate exposure to TCA has any effect on the heart.

Liver and Kidney: Very high levels of TCA can damage the liver and kidneys, but this is extremely unlikely to occur without noticeable effects on your nervous system occurring first.

Cancer: We do not know whether TCA can cause cancer. Adequate testing has not been done to determine whether TCA causes cancer in animals, and no one has studied the cancer rates of exposed

workers.

Reproductive System: In laboratory tests, TCA did not cause birth defects in animals or affect the reproductive function of male animals. We do not know whether TCA can affect pregnancy or the reproductive function in humans. However, TCA inhaled by a pregnant woman can reach the developing fetus and can contaminate the breast milk. TCA may affect the health of an infant or a developing fetus just as it can affect the mother. Therefore, we recommend that pregnant or nursing women minimize their exposure to TCA and other toxic chemicals.

TESTS FOR EXPOSURE AND MEDICAL EFFECTS

No medical or laboratory test is recommended or legally required for workers exposed to TCA. However, it is generally recommended that workers who are regularly exposed to TCA or other hazardous substances receive a complete physical examination, including an occupational and medical history, at the beginning of employment and periodically thereafter.

A physician or other health care provider can choose specific tests on a case-by-case basis to evaluate exposure and possible effects. HESIS physicians can assist with such medical evaluations.

LEGAL EXPOSURE LIMITS

California's Division of Occupational Safety and Health ("Cal/OSHA") sets and enforces workplace chemical exposure limits. Cal/OSHA has set a Permissible Exposure Limit (PEL) for the amount of TCA in the air you breathe. The PEL for trichloroethane is 350 parts of TCA per million parts of air (350 parts per million, or 350 "ppm"). This is equal to 1900 milligrams of TCA per cubic meter of air (1900 mg/m^3).

Your exposure may legally be above 350 ppm at times, but only if it is *below* 350 ppm at other times, so that your *average* exposure for any single 8-hour workshift is 350 ppm or less.

There is also an "excursion limit" of 450 ppm, which must not be exceeded during any 15-minute averaging period.

If you have any of the symptoms described above while working with TCA, you may be exposed at more than the legal limits. Talk to your supervisor, your union representative, or other people listed under "Resources" on page 4. If you might be exposed to a substance at more than the legal exposure limit, your employer must measure the amount of the chemical present in the air in the work area (Cal/OSHA regulations, *GISO 5155*). You have the right to see the results of monitoring relevant to your exposure (*GISO 3204*).

You also have the right to see and copy your own medical records and the records of your exposure to toxic substances. These records are important in determining whether your health has been affected by your work. If your employers have such records, they must keep them and make them available to you for at least 30 years after the end of your employment.

You should not rely on your sense of smell to warn you of overexposure to TCA. Some people can smell TCA even when the concentration in the air is well below the PEL of 350 ppm, while others may not smell it even at levels well above the PEL. Moreover, your sense of smell can become dulled or fatigued from exposure to an odor. Measuring the amount of a substance in the air is the only reliable way to determine your exposure level.

REDUCING YOUR EXPOSURE

Your employer is required to protect you from being exposed to TCA at levels above the PEL. For information about how Cal/OSHA and Cal/OSHA Consultation Service can help you and your employer, see the "Resources" section on page 4.

Substitution: The most effective way to reduce hazardous chemical exposures is to use a safer chemical, if one is available. However, the health and safety hazards of any substitute must also be carefully considered, to ensure that it is actually safer.

Engineering Controls: Engineering control methods must be used if possible. Engineering control methods include ventilation systems, changes in the work process, and changes in work practices. Containers and vats should be tightly covered to prevent evaporation. Some work processes can be isolated, enclosed, or automated to reduce exposures.

Local exhaust ventilation systems ("hoods" or flexible suction hoses) are the most effective type of ventilation. These systems capture contaminated air at its source before it spreads into the air in your breathing zone.

Personal Protective Equipment: When engineering controls cannot sufficiently reduce exposures, a respirator must be worn and a respiratory protection program must be developed, as outlined by Cal/OSHA regulations (*GISO 5144*). An industrial hygienist or other knowledgeable person should be consulted to ensure that the equipment is appropriate and is used correctly.

- If frequent and prolonged contact with liquid TCA is unavoidable, or if splashing may occur, other protective equipment such as gloves or faceshields should be worn. Protective clothing should be made of a material which is resistant to TCA (such as polyvinyl alcohol). Even the most resistant materials will be penetrated quickly and should be replaced often.