

**1,1-DICHLOROETHYLENE**  
**(C<sub>2</sub>H<sub>2</sub>Cl<sub>2</sub>) CAS #75-35-4 (Volatile Organic Compound)**  
**Synonyms include DCE; 1,1-dichloroethylene; 1,1-DCE**  
**asym-dichloroethylene; vinylidene dichloride; vinylidene chloride**

**SOURCE/USE**

1,1-dichloroethene must be synthesized and does not occur naturally. It is used primarily as an intermediate in production of food wraps, flame retardant coatings, carpet backing, and pipe wraps. DCE can occur as a trace residual in polyvinylidene products and can be regenerated by the breakdown of these products.

**ROUTES OF EXPOSURE**

1,1-dichloroethene is absorbed via inhalation, ingestion or skin exposure. Occupational exposures are primarily via inhalation. 1,1-dichloroethene evaporates rapidly, thus skin absorption may be limited. Oral exposure in humans, when it occurs, is generally due to contaminated food or water.

Although the risk of off-post acute exposure to 1,1-dichloroethene as a result of remediation at the Rocky Mountain Arsenal is very small, any such exposure would very likely be via inhalation. Also, the concentrations resulting in acute clinical effects discussed in this document reflect occupational exposures or animal studies and are much higher than those likely to be encountered at the fence line during remediation at the RMA. DCE is a volatile, colorless liquid with a mild sweet odor resembling that of chloroform. It evaporates quickly at usual temperatures.

<b>APPLICABLE STANDARDS AND LIMITS</b>	
ATSDR MRL	Intermediate 0.08 mg/m <sup>3</sup>
OSHA PEL	4 mg/m <sup>3</sup>
ACGIH TLV	20 mg/m <sup>3</sup>
Odor recognition	2000 mg/m <sup>3</sup>
RMA acute fence line criteria	ARC - 0.2 mg/m <sup>3</sup> MARC - 2.0 mg/m <sup>3</sup>
RMA chronic fence line criteria	Cancer - 0.054 µg/m <sup>3</sup> Noncancer - 32.0 µg/m <sup>3</sup>

The goal of the remediation is exposure prevention through remedial design, environmental monitoring, and modeling. Failure of prevention could result in acute and/or chronic exposures. Following is an overview of the types of health effects associated with 1,1-dichloroethene exposure.

### **ACUTE HEALTH EFFECTS**

High levels of exposure in animals and man produce CNS depression with lethargy, confusion, drowsiness, loss of consciousness and death. Full recovery is expected after non-fatal exposures. High levels of exposure to 1,1-dichloroethene in animals produced hemorrhage, pulmonary edema, and cellular damage in the lung. These effects are partially reversible.

Liquid 1,1-dichloroethene is an irritant to skin and eye after only a few minutes of exposure.

The liver is a major target organ for DCE, with severe liver damage due to metabolites formed by oxidation of the DCE. Fasting enhances the damaging effect, which is thought to be due to depletion of glutathione. GSH detoxifies DCE before it can be oxidized to toxic metabolites, and differences between species in available GSH may explain the large variation seen between species in vulnerability to DCE.

Very high doses may sensitize heart muscle to adrenalin, resulting in rhythm disturbances. High levels of DCE increase the loss of embryos (fetotoxicity) and produce malformations in animal newborns. Damage to DNA and increased mutations in some test systems are reported.

### **CHRONIC HEALTH EFFECTS**

Most animal testing has not found increased cancer. The EPA classifies 1,1-dichloroethene as a possible human carcinogen.