CHLOROFORM

($CHCl_3$) CAS # 67-66-3 (Volatile Organic Compound)

Synonyms include trichloromethane, methenyl chloride, Freon 20

SOURCE/USE

Chloroform was used primarily in the production of chlorodifluoromethane which is used as a refrigerant for home air conditioners and supermarket freezers. It is used as a solvent for fats, oils, greases, resins, lacquers, rubber, alkaloids, gums, waxes, penicillin, vitamins, and floor polishes. It is also used as a heat transfer medium in fire extinguishers, as an intermediate in the preparation of dyes and pesticides, and as a fumigant. Chloroform is expected to be one of the more toxicologically important air contaminants found during remediation projects.

ROUTES OF EXPOSURE

Most exposures to chloroform occur by inhalation. Although the risk of off-post acute exposure to chloroform 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 exposures when used as anaesthesia or from occupational scenarios. These exposures are much higher than those likely to be encountered at the fence line during remediation at the RMA. The odor of chloroform does not adequately provide warning of acutely hazardous concentrations. Chloroform is heavier than air and may cause asphyxiation in enclosed, poorly ventilated, or low-lying areas. Other routes of exposure include dermal/ocular contact and ingestion.

APPLICABLE STANDARDS AND LIMITS	
ATSDR MRL	Acute 0.48 mg/m3 Intermediate 0.24 mg/m3 Chronic 0.10 mg/m3
NIOSH STEL	9.76 mg/m^3
OSHA STEL	24.41 mg/m^3
ACGIH TWA	49 mg/m^3
Odor threshold	937 mg/m^3
RMA acute fence line criteria	ARC - 0.5 mg/m^3 MARC - 1.7 mg/m^3
RMA chronic fence line criteria	Cancer - 0.12 $\mu g/m^3$ Noncancer - 0.3 $\mu g/m^3$

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 chloroform exposure.

ACUTE HEALTH EFFECTS

Generally, symptoms of CNS toxicity from chloroform exposure include dizziness, vertigo, exhaustion, lack of concentration, depression, hallucinations, pronounced ataxia, dysarthria, and hypomnesia.

Increased respiratory rates are observed in patients exposed to chloroform via light anaesthesia.

Chloroform exposure related to anaesthesia (8,000-10,000 ppm) may cause bradycardia, cardiac arrhythmia (nodal rhythm, first degree atrioventricular block, or complete heart block), and hypotension.

No studies were located regarding the dermal effects in humans after inhalation exposure to chloroform.

No studies were located regarding ocular effects in humans after inhalation exposure to chloroform.

Effects of chloroform include nausea, vomiting, and dry mouth.

Transient jaundice and liver enlargement are sometimes observed in patients exposed to chloroform via anesthesia. Occupationally exposed individuals may have effects of toxic hepatitis (hepatomegaly, elevated serum glutamic pyruvic transaminase and serum glutamic oxaloacetic transaminase levels, and hypergammaglobulinemia).

Effects of chloroform include elevated levels of ß-2-microglobulin.

CHRONIC HEALTH EFFECTS

Chloroform is classified as a probable human carcinogen. There is no available data on the developmental and reproductive effects of chloroform after inhalation exposure.

Inhalation of chloroform may result in increased abnormalities in sperm.