VINYL CHLORIDE

FACT SHEET ON A DRINKING WATER CHEMICAL CONTAMINANT

GENERAL INFORMATION

Synonyms:
- Monochloroethylene; Chloroethene

Chemical Description:
- Synthetic organic compound; no natural sources

Properties:
- Gas at standard temperatures
- Highly flammable
- Sweet, pleasant odor in sufficient concentrations
- Sparingly soluble in water, soluble in alcohol, and very soluble in ether and carbon tetrachloride

Production and Use:
- Production in 1979 was about 7 billion pounds
- Used as raw material in the plastics, rubber, paper, glass, and automotive industries
- Used in manufacturing electrical wire insulation and cables, piping, industrial and household equipment, medical supplies, food packaging, and building and construction products
- Distributed and processed in a variety of forms, including dry resins, plastisol, organosol, and latex

ENVIRONMENTAL PROFILE

Occurrence:
- Does not occur widely in the environment because of its rapid degradation and limited release
- Relatively rare contaminant in ground and surface waters with higher levels found in ground water; the major source of exposure is from contaminated water
- Less than 2% of all ground water derived public water systems contain vinyl chloride at levels of 1µg/L or higher
- Approximately 1 part per billion may be found in food from food containers
- Almost always co-exists with trichloroethylene

Releases:
- Environmental releases will be limited to the areas where vinyl chloride is produced and used

Environmental Fate:
- When released to air, it is degraded in a few hours
- When released to surface waters, it evaporates to the atmosphere in a few hours or days, where it undergoes rapid photochemical oxidation
- It does not bind to soil but rather migrates readily to ground water, where it is expected to remain for months to years

HEALTH EFFECTS

Humans:
- Symptoms of chronic inhalation exposure include central nervous system disturbances and adverse liver, lung, cardiovascular, bone, and gastrointestinal effects
- At high inhalation levels, occupational workers have experienced dizziness, headaches, euphoria, and narcosis
- Increases in the occurence of liver cancer as well as tumors of the brain, lung, and bone marrow and lymph tissues have been associated with occupational exposures to vinyl chloride
- Vinyl chloride is classified as a group A carcinogen, a human carcinogen

Experimental Animals:
- Oral exposure in rats at doses above 30 mg/kg for 13 weeks—adverse blood and organ weight changes
- Inhalation exposure in mammals at 50 parts per million, 7 hours/day for 189 days—no apparent toxicity; rats exposed to 100 ppm, 2 hours/day for 65 months—increased liver weights
- No reproductive and developmental effects; inconclusive fetal toxicity
- Mutagenic in bacterial and mammalian cells

REGULATORY HISTORY

Existing Standards:

- **Clean Air Act (CAA):** Not available
- **Clean Water Act (CWA):** Registered
- **Resource Conservation and Recovery Act (RCRA):** Listed for ground-water monitoring
- **Superfund (CERCLA):** Reportable Quantity 1 pound
- **SARA:** Listed
- **Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA):** Listed
- **Toxic Substances Control Act (TSCA):** On Inventory

HEALTH INFORMATION

Maximum Contaminant Level Goals (MCLG):

- Non-enforceable levels based solely on an evaluation of possible health risks and exposure, and taking into consideration a margin for public safety

MCLG for Vinyl Chloride = 0 mg/L

Maximum Contaminant Levels (MCL):

- Legally enforceable levels for contaminants in public drinking water supplies
- Based on health risks associated with the contaminants, analytical methods for their assay, and water treatment feasibility and practicality aspects

MCL for Vinyl Chloride = 0.002 mg/L

EPA Health Advisories (HA):

- **Short-term HAs:** Provide acceptable concentrations of contaminants in water for up to 10 day exposures, primarily to evaluate the public health risk resulting from an accidental spill or an emergency contamination situation
- **Longer-term HAs:** Provide guidance for persistent water contamination situations to cover a period of up to 7 years
- **Lifetime HAs:** Derived in the same way as an MCLG

Health Advisories:

Short-term HA for a child = 2.6 mg/L
Longer-term HA for a child = 0.013 mg/L
Longer-term HA for an adult = 0.046 mg/L

ANALYTICAL METHODS

- Gas chromatography
  EPA Method 502

WATER TREATMENT

Permanent Technology:

Best Available Technology (BAT):

- The value of Henry's Law Constant for vinyl chloride (6.4 atm-m^3/mole) suggests aeration as a potential removal technique for vinyl chloride in water

SHORT-TERM HAZARD ELIMINATION

- If the drinking water standards are exceeded, install BAT or use an alternative drinking water supply such as bottled water
- Boiling might remove vinyl chloride—potential inhalation hazard

ADDITIONAL HELP

- State or county health officials can indicate a certified laboratory for testing
- Experts in the state Department of Environmental Protection or Natural Resources may also be of help
- The EPA has toll-free numbers for further information on drinking water quality, treatment technologies, for obtaining Health Advisories, and for other regulatory information
- EPA Hotlines are available Monday through Friday, 8:30 a.m. to 4:30 p.m. EST:

•Safe Drinking Water:	**800-426-4791**
•Air Quality:	**800-631-2700**
•National Pesticides:	**800-858-PEST**
•Superfund/RCRA:	**800-424-9346**
	800-343-3958

- For information on the Clean Water Act, call (202) 260-7301
- For information on the Toxic Substances Control Act, call (202) 554-1404