Vinyl Chloride & Health

CATEGORIES

Topics Health, Air Pollution

Programs Outdoor Air Quality Standards, Exposure

Type Information

CONTACT

Research Division

Email research@arb.ca.gov

Phone (916) 445-0753

What is vinyl chloride?

Vinyl chloride (chloroethene), a chlorinated hydrocarbon, is a colorless gas with a mild, sweet odor. Most vinyl chloride is used in the process of making polyvinyl chloride (PVC) plastic and vinyl products, thus may be emitted from industrial processes. Vinyl chloride has been detected near landfills, sewage treatment plants, and hazardous waste sites, due to microbial breakdown of chlorinated solvents, although levels above the standard have not been measured in California since the 1970's. Today, vinyl chloride exposure is primarily an occupational concern.

History of the vinyl chloride Ambient Air Quality Standard

The ambient air quality standard for vinyl chloride is unique among the California Ambient Air Quality Standards (CAAQS) in that it addressed a localized exposure risk, rather than a statewide risk. The standard for vinyl chloride was set in 1978 to address elevated cancer risk in three areas of California that were adjacent to industrial facilities that emitted vinyl chloride from their production processes. The level of the standard, 0.010 ppm as a 24 hour average was chosen because it was the lowest level that could be reliably measured at the time the standard was promulgated, and could thus function as an enforceable exposure limit.

Vinyl chloride is the only pollutant that has a CAAQS and is also listed as a toxic air contaminant because of its carcinogenicity. The Air Toxics Program, which lists and regulates cancer causing pollutants, had not yet been established at the time CARB determined there was a need to control vinyl chloride emissions. Consequently, CARB used the CAAQS process because it was the only means available at that time to regulate vinyl chloride emissions. Then in 1990, the Board identified vinyl chloride as a toxic air contaminant under the recently established Air Toxics Program, and established a cancer unit risk factor. As a carcinogen, no level of exposure to vinyl chloride is considered as being completely safe and without risk. Although the vinyl chloride CAAQS remains in force, current regulatory efforts are under CARB's Air Toxics Program.

What kinds of harmful effects can vinyl chloride cause?

Short-term exposure to high levels (10 ppm or above) of vinyl chloride in air causes central nervous system effects, such as dizziness, drowsiness, and headaches. The primary non-cancer health effect of long-term exposure to vinyl chloride through inhalation or oral exposure is liver damage. Inhalation exposure to vinyl chloride has been shown to increase the risk of angiosarcoma, a rare form of liver cancer in humans. Current Occupational Safety and Health Administration (OSHA) regulations allow occupational exposures of up to an 8-hour average of 1 ppm vinyl chloride.

There is little information available on possible environmental effects of vinyl chloride.

Who is at the greatest risk from exposure to vinyl chloride?

Most health data on vinyl chloride relate to carcinogenicity. Thus, the people most at risk are those who have long-term exposure to elevated levels. Today, this is more likely to occur in occupational or industrial settings. Control methodologies currently applied to industrial facilities prevent emissions to the ambient air.

Is vinyl chloride a problem indoors?

Outside of occupational and industrial settings, there are no known indoor sources of vinyl chloride emissions.

What is the Ambient Air Quality Standard for vinyl chloride?

	24-Hour Average
National Ambient Air Quality Standard	None
California Ambient Air Quality Standard	0.01 ppm

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(800) 242-4450 | helpline@arb.ca.gov
1001 I Street, Sacramento, CA 95814
P.O. Box 2815, Sacramento, CA 95812

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