



TECHNICAL SUPPORT DOCUMENT

**PROPOSED IDENTIFICATION OF
VINYL CHLORIDE
AS A TOXIC AIR CONTAMINANT**

**SCIENTIFIC REVIEW PANEL VERSION
EXECUTIVE SUMMARY AND PART A**

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**State of California
Air Resources Board
Stationary Source Division**

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EXECUTIVE SUMMARY

What is a toxic air contaminant?

According to Section 39655 of the California Health and Safety Code, a toxic air contaminant is "an air pollutant which may cause or contribute to an increase in mortality or an increase in serious illness, or which may pose a present or potential hazard to human health." In addition, "substances which have been identified as hazardous air pollutants pursuant to Section 7412 of Title 42 of the United States Code shall be identified by the state board as toxic air contaminants."

Does the Air Resources Board (ARB) staff recommend identification of vinyl chloride as a toxic air contaminant?

Yes, we recommend that vinyl chloride be identified as a toxic air contaminant because:

- o there is sufficient evidence that exposure to vinyl chloride poses a public health hazard,
- o vinyl chloride is detected in ambient and indoor air near known emission sources and does not break down in the atmosphere at a rate that would significantly reduce public exposure, and
- o vinyl chloride shall be identified as a toxic air contaminant pursuant to Section 39655 of the California Health and Safety Code because it is listed as a hazardous air pollutant by the federal government pursuant to Section 7412 of Title 42 of the United States Code.

Why does the ARB staff recommend the identification of vinyl chloride as a toxic air contaminant when a State ambient air quality standard already exists?

The State ambient air quality standard of 10 ppb averaged over 24 hours merely reflects the limit of detection (LOD) for vinyl chloride ambient air concentration analysis in 1978 when the standard was promulgated. This technology-based standard is not recognized as health-protective. The identification of vinyl chloride as a toxic air contaminant would allow health-protective control measures to be implemented at concentrations below 10 ppb.

What evidence exists that exposure to vinyl chloride poses a public health hazard?

Acute exposure to vinyl chloride has lead to narcosis, cardiovascular and respiratory irregularity, convulsions, cyanosis, and death. Chronic exposure of workers to vinyl chloride has induced acro-steolysis, vasospasm of the hands, dermatitis, circulatory and CNS alterations, thrombocytopenia, splenomegaly, and changes in liver function. However, these noncarcinogenic effects occur at vinyl chloride concentrations near or above 10 ppm which is far greater than either the California average ambient level of less than 0.5 ppb or measured ambient hot spot concentrations of about 10 to 15 ppb. Therefore, the DHS staff do not expect noncarcinogenic adverse health effects to occur from exposures to current concentrations of vinyl chloride found in ambient air.

The International Agency for Research on Cancer (IARC), the United States Environmental Protection Agency (EPA), and the California Department of Health Services (DHS) have designated vinyl chloride a chemical for which there is sufficient evidence of carcinogenicity in both humans and experimental animals. Epidemiological studies of occupationally exposed human workers have linked vinyl chloride exposure to the development of a rare cancer, liver angiosarcoma, and have suggested a relationship between exposure and cancers of the lung and brain. Chronic inhalation and oral exposures of rats, mice, and hamsters to vinyl chloride have been associated with an increased incidence of malignant and benign tumors at several sites including the liver, lungs, mammary glands, and the nervous system. Vinyl chloride is mutagenic in both prokaryotic and eukaryotic test systems.

Is there a threshold level for vinyl chloride?

Since vinyl chloride is mutagenic and there is not sufficient evidence at this time to support the designation of an exposure level below which no significant adverse health impacts are anticipated, the DHS staff recommend that vinyl chloride be treated as having no threshold exposure level.

Is vinyl chloride produced or used in California?

Vinyl chloride is not produced in California, however, it is estimated that several thousand tons are used each year by two facilities producing polyvinyl chloride. Polyvinyl chloride is used by fabricators for the production of materials employed by the construction, packaging, electrical, and transportation industries.

What are the sources of vinyl chloride emissions?

Landfills, publicly-owned treatment works (POTWs), and polyvinyl chloride (PVC) production and fabrication facilities are the major identified sources of vinyl chloride emissions in California.

The South Coast Air Quality Management District (SCAQMD) obtained vinyl chloride ambient monitoring (LOD = 2 ppb) from locations near two landfills in the South Coast Air Basin. At the BKK Landfill from January through December of 1987, 24-hour average concentrations of vinyl chloride ranged from below the LOD to 15 ppb with a mean of 1.2 to 2.6 ppb. At the OII Landfill from January through December of 1986, 24-hour average concentrations of vinyl chloride ranged from below the LOD to 9.8 ppb with a mean of 1.0 to 2.0 ppb. The OII Landfill is currently a federally listed superfund site. Subsequent to the SCAQMD's vinyl chloride sampling during 1986, the EPA has implemented more stringent landfill gas control measures. The EPA has also selected a remedy for landfill gas control that is expected to substantially further reduce landfill gas emissions from the OII Landfill. It is fully anticipated that these control measures will substantially lower the levels of vinyl chloride in the ambient air in the vicinity of the OII Landfill.

What is the exposure level of people living near sources such as landfills?

Population-weighted exposure results, based on computer modeling by ARB staff, show that approximately four million people living near the OII Landfill were exposed to an estimated annual average vinyl chloride concentration ranging from 0.004 to 0.06 ppb in 1986. The maximum exposed individual living near OII Landfill was estimated to be exposed to an annual average vinyl chloride concentration ranging from 0.6 to 8.7 ppb. For the BKK Landfill, the population-weighted exposure results show that approximately two million people were exposed to estimated annual average vinyl chloride concentrations ranging from 0.08 to 0.34 ppb in 1987. The maximum exposed individual living near BKK was estimated to be exposed to an average annual concentration of 2.3 to 10.3 ppb. These exposure estimates are based on ambient data only and do not include any possible elevated indoor exposures that may occur inside homes near landfills.

The data gathered in the Landfill Gas Testing Program (Section 41805.5 of the 1986 California Health and Safety Code) will be used to provide a relative ranking of the sites based on the potential for emissions of toxic compounds and the potential for exposure.

Is there evidence of indoor air exposure to vinyl chloride?

In California, indoor air vinyl chloride has been detected only in houses near landfills. Some homes near landfills have been shown to accumulate vinyl chloride to the extent that indoor concentrations are several times greater than general outdoor concentrations. Landfill gas containing vinyl chloride may contribute to indoor air concentrations by direct outdoor air influx or by underground migration and subsequent entrance through the substructures of homes.

In 1985, elevated levels of vinyl chloride in the water meter boxes of several homes adjacent to the OII Landfill prompted a South Coast Air Quality Management District indoor air grab-sample study. Indoor air