MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

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INTEROFFICE COMMUNICATION

To: **File for Allyl Chloride (CAS# 107-05-1)**

From: George Eurich

Date: 4-17-2012

Subject: **Screening level for Allyl Chloride (CAS# 107-05-1)**

The Initial Threshold Screening Level (ITSL) for Allyl Chloride is 1 µg/m³ (annual average).

A Second ITSL for Allyl Chloride is 31 µg/m³ (8 hr average).

The Air Quality Division (AQD) adopted the screening level for allyl chloride in 1990 based on the Environmental Protection Agency (EPA) reference concentration (RfC) of 1 µg/m³ (24 hour averaging time). The RfC basis was a 5-month rabbit inhalation study establishing a no-observable-adverse-effect-level (NOAEL) for neurological effects of 17 mg/m³ [NOAEL (HEC[1]) = 3.6 mg/m³]. The peripheral nervous system has been identified as a sensitive target in humans.

A Second ITSL for allyl chloride was derived based on the American Conference of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) of 1 ppm (3.1 mg/m^3). The TLV was developed to protect against peripheral neuropathy. The Second ITSL was determined according to R336.1232(c) where ITSL = 1% of TLV. Rounding to 1 significant figure results in an ITSL of 30 µg/m³ with an 8-hr averaging time. In calculating the shorter average time Second ITSL (i.e., 8-hr), the average time for the primary ITSL (i.e., 1 µg/m³) has been revised from 24 hour to annual averaging time.

The chronic ITSL is based on an RfC which typically is assigned an averaging time of 24-hours pursuant to Rule 232(2)(b). However, if the RfC-based ITSL is established in conjunction with an acute ITSL (e.g., ACGIH TLV), the chronic RfC-based ITSL can more appropriately have an annual averaging time. ITSLs based on a chronic inhalation study and/or derived using uncertainty factors to adjust for lifetime exposure, are typically associated with long averaging times such as an annual average. Coupling a chronic ITSL with an acute ITSL ensures that exposure levels below both ITSLs will provide effective health protection.

Allyl chloride previously was categorized as a probable human carcinogen (B2) by EPA. This classification was revised in 1990. The compound is currently listed as category C, a possible human carcinogen. This reclassification was based on a lack of evidence in humans and “a low (but biologically important) incidence of fore stomach tumors in female mice, and positive results in a variety of genetic toxicity tests.” The specific study

[1] HEC = human equivalent concentration

identifying the fore stomach tumors in mice found no significant increase in tumors relative to concurrent vehicle controls or untreated animals, however did note significance relative to historical control data from the same laboratory. Similar studies in male and female rats revealed no statistically significant increases in tumor incidence at any sites. The power of both rat and mouse studies were compromised due to the very high mortality due to high toxicity, especially in the high-dose groups.

CAL-OEHHA (California Office of Environmental Health Hazard Assessment) has delisted allyl chloride from the Proposition 65 list.

This review is in concert with an AQD Toxics Unit initiative to re-evaluate screening levels for Hazardous Air Pollutants (HAPs) for consistency with EPA's health protective benchmarks. The AQD has concluded that the ITSL of 1 µg/m³ (annual average) and the Second ITSL of 31 µg/m³ (8 hr avg) to be the appropriate screening levels for allyl chloride.

References:

CAL-OEHHA Online. Proposition 65 – Chemicals Under Reconsideration. Chemicals Listed as "Causing Cancer" Under Authoritative Bodies Mechanism and Under Review for Possible Delisting:
Allyl Chloride, Chlorodibromomethane, 1,1-Dichloroethane, P-Toluidine, Zineb
http://oehha.ca.gov/prop65/CRNR_notices/chemicals_reconsideration/fdelist991.html

U.S. Environmental Protection Agency. *Integrated Risk Information System (IRIS) on Allyl Chloride*. National Center for Environmental Assessment, Office of Research and Development, Washington, DC. 1999.

ACGIH. 2010. TLVs and BEIs based on the documentation of the threshold limit values for chemical substances and physical agents & biological exposure indices. ACGIH. Cincinnati, OH.