MICHIGAN DEPARTMENT OF NATURAL RESOURCES

INTEROFFICE COMMUNICATION

FEBRUARY 27, 1995

TO: File for 1,2-dichlorotetrafluoroethane (Freon 114)
CAS # 76-14-2

FROM: Marco Bianchi

SUBJECT: Initial Threshold Screening Level

The initial threshold screening level (ITSL) for 1,2-dichlorotetrafluoroethane (Freon 114) is 69,000 $\mu g/m^3$ based on an 8 hr. averaging time.

The following references or databases were searched to identify data to determine the ITSL: IRIS, HEAST, NTP Management Status Report, RTECS, EPB-CCD, EPB library, CAS-online, NLM-online, IARC, NIOSH Pocket Guide, and ACGIH Guide.

Various rodent acute toxicity studies listed in RTECS have shown that Freon 114 has a low toxicity, and acts like a weak narcotic when inhaled. ACGIH documentation listed exposure concentrations of 70% in air spiked to 20% oxygen, that are lethal to mice, rats, and rabbits. In one study, two-hour exposures at 300,000-400,000 ppm disturbed the equilibrium of rats and guinea pigs, while another study noted irregular breathing but "no toxic action" in guinea pigs exposed for 2 hours at 8000 - 47,000 ppm.

Subchronic studies showed repeated application of Freon 114 as a 40% solution in sesame oil to rabbit skin was without effect. One study reported that dogs survived 21 eight-hour exposures at 142,000 - 150,000 ppm Freon 114. The animals showed slight blood changes and symptoms ranging from incoordination to occasional convulsions. A 4-week study with twenty 3.5 hour exposures at 100,000 ppm revealed no effects in dogs, cats, guinea pigs, and rats.

In a carcinogenicity study, rats and rabbits exposed 2 hours/day, 5 days/week for 8 to 9 months to Freon 114 showed no significant clinical, hematologic, or histopathologic change. This chemical also gave negative results when tested in Salmonella typhimurium TA15351 in the absence or presence of a metabolic activating system.

Human data is limited for Freon 114. Ten subjects were exposed to a mixture of chlorofluorocarbons at concentrations between 16,000 and 150,000 mg/m^3 for 15, 45, and 60 seconds. Significant acute reduction of ventilatory lung capacity was reported in each case, as well as bradycardia and increased variability in heart rate and atrioventricular block. It was concluded that the mixtures exerted stronger respiratory effects than individual chlorofluorocarbons at the same level of exposure.

The ACGIH recommended a TLV of 1000 ppm (6900 mg/m^3) to provide a wide margin of safety in preventing systemic toxicity, and an adequate margin in preventing cardiac sensitization from exposure to Freon 114.

The ITSL was derived as follows:

ACGIH TLV = 6900 mg/m^3

6900 mg/m^3 x 1000 ug/mg = 6,900,000 ug/m^3

ITSL = 1% of the ACGIH

6,900,000 ug/m^3 x 0.01 = 69,000 ug/m^3

The ITSL for 1,2-dichlorotetrafluoroethane = 69,000 $\mu g/m^3$ based on 8 hr. averaging.

References:

ACGIH. 1994. Documentation of the TLV's and BEI's.

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