

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

February 6, 2017

TO: File for 1,1,1,3,3-Pentafluoropropane (CAS No. 460-73-1)
FROM: Mike Depa, Air Quality Division, Toxics Unit
SUBJECT: Derivation of Initial Threshold Screening Level

The initial threshold screening level (ITSL) for 1,1,1,3,3-pentafluoropropane is 2000 $\mu\text{g}/\text{m}^3$, with annual averaging time.

Previously, the averaging time (AT) assigned to the 1,1,1,3,3-pentafluoropropane ITSL was 24 hours, pursuant to Rule 232(2)(b) of the Air Pollution Control Rules promulgated at that time (July 12, 2002; see attached memo). The recently promulgated (December 22, 2016) Air Pollution Control Rule 232(2)(b) states that ITSLs based on Rule 232(1)(a) are assigned an annual averaging time. An updated literature review was not performed at this time.

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

July 12, 2002

TO: 1,1,1,3,3-Pentafluoropropane file (CAS # 460-73-1)

FROM: Gary Butterfield

SUBJECT: Screening level for 1,1,1,3,3-Pentafluoropropane

1,1,1,3,3-Pentafluoropropane is a colorless liquid with a boiling point of 15 degrees Celsius. It has a molecular weight of 134.1 g/mol. This chemical is also commonly known as HFC-245fa. It is used as a refrigerant, useful for replacing more ozone depleting refrigerant CFC chemicals. It is also used as a blowing agent in foam plastic manufacture.

The following references or databases were searched to identify data to determine the screening level: U.S. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS), National Institute for Occupational Safety and Health (NIOSH) Registry for Toxic Effects of Chemical Substances (RTECS), American Conference of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs), Michigan Department of Environmental Quality (DEQ) library, International Agency for Research on Cancer (IARC) Monographs, Chemical Abstract Service (CAS) Online (1993- June 2002), National Library of Medicine (NLM) - Toxline, and National Toxicology Program (NTP) Status Report. The CAS on-line literature search was conducted on June 2, 2002. The NLM Toxline on-line literature search was conducted June 17, 2002.

There is very little toxicity information available for this chemical. The best study upon which to base the screening level is the study reported by Rusch et al (1999). This article reports the results of many studies conducted with HFC245fa. Included in this report are the results from an acute study, as well as from a couple of mutagenicity studies, and 14-day, 28-day, 13-week inhalation studies and a developmental toxicity inhalation study.

The best study for setting the screening level is the 13-week inhalation study with a reported NOAEL of 2000 ppm. This is the longest duration study, which had the lowest NOAEL. The developmental study found the maternal effects NOEL 2000 ppm (maternal reduced body weights at 10,000 ppm and higher doses) to be lower than the fetal effects NOEL of 10,000 ppm (pup weights were reduced at 50,000 ppm). Therefore, the NOAEL from 13-week study, which is the same concentration as the developmental maternal NOEL, would be protective for any developmental effects as well. In the 13-week study, rats in the high two dose levels (10,000 and 50,000 ppm) exhibited: increased urine volumes; increased urinary fluoride; increased red blood cell counts; increased blood enzyme activity of AP, GOT, GPT and CPK; and mild myocarditis.

The initial threshold screening level (ITSL) can be calculated using the RfC methodology from EPA. 1,1,1,3,3-Pentafluoropropane can be considered to be a category 3 gas, producing its toxic effects at extra-respiratory locations. The default ratio of animal to human blood:gas partitioning coefficients is 1 to 1. This is the value used in the following calculations due to no information being available on blood:gas partitioning for this chemical.

NOAEL = 2000 ppm or 10960 mg/m³

NOAEL(adj) = (10960 mg/m³)x(5 day/7 day)x(6 hr/24 hr)=1960 mg/m³

NOAEL(hec) = NOAEL(adj) x 1/1 = 1960 mg/m³

RfC (1960 mg/m³)/(10x10x10) = 1.96 mg/m³

RfC = 2000 µg/m³ (rounded to one significant figure)

Where uncertainty factors of 10 were used for the three factors in the above calculation: intra-species variation, inter-species variation, and sub-chronic to chronic study duration adjustment.

The ITSL is being set at 2000 µg/m³, with 24-hour averaging time, based on the above RfC calculations.

Reference

Rusch et al. 1999. The acute, genetic, developmental, and inhalation toxicology of 1,1,1,3,3-pentafluoropropane. *Toxicological Sciences* 52:289-301.