

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

August 1, 2003

TO: Perfluoroisobutylene File (CAS #382-21-8)
FROM: Mary Lee Hultin, Toxics Unit, Air Quality Division (AQD)
SUBJECT: Initial Threshold Screening (ITSL) Level for Perfluoroisobutylene

The ITSL for perfluoroisobutylene is $0.8 \mu\text{g}/\text{m}^3$ based on a 1-hour averaging time.

The following references or databases were searched to identify data to determine the ITSL: Integrated Risk Information System, Health Effects Assessment Summary Tables, National Toxicology Program Management Status Report - online, Registry for Toxic Effects of Chemical Substances (RTECS), Michigan Department of Environmental Quality's Chemical Criteria Database, EPB library, Chemical Abstract Service (CAS) - online, National Library of Medicine - online, International Agency for Research on Cancer - online, National Institute for Occupational Safety and Health Pocket Guide, and the American Conference of Governmental and Industrial Hygienists Guide.

A review of the above databases found limited toxicological information on perfluoroisobutylene (PFIB). PFIB is a colorless gas that is pneumoedematogenic (Lehnert, et al.). It is a recognized combustion product of polymerized fluorocarbon compounds, including Teflon. Exposure to PFIB can cause lung injury shortly after exposure, at a level that is not detectable by conventional lung gravimetric and histopathological criteria (ibid). The mechanism of toxicity is unknown, though some researchers suggest the involvement of hydrofluoric acid as an in vivo hydrolysis product.

RTECS listed respective LC50 values for the guinea pig, rat and rabbit as 1050 ppb/2 hr., 500 ppb/6 hr., and 1200 ppb/2 hr. The American Conference of Governmental Industrial Hygienists has a TLV-Ceiling value of 0.01 ppm (0.082 mg/m³). This value is designed to protect against acute pulmonary and adverse systemic effects as determined by laboratory animal studies.

The ITSL was derived as follows:

No inhalation reference concentration or dose (RfC or RfD) were available from U.S. EPA, nor was there sufficient data to derive an RfC or RfD. There were occupational exposure levels available through ACGIH, The methodology in Act 451, Part 2, Rule 232 (1) (c) yields the following ITSL for this compound:

$$\text{ITSL} = 0.082 \text{ mg/m}^3 / 100 = .00082 \text{ mg/m}^3$$

Conversion of mg/m³ to ug/m³

$$.00082 \text{ mg/m}^3 \times \frac{1000 \text{ ug}}{1 \text{ mg}} = 0.8 \text{ ug/m}^3$$

The ITSL for perfluoroisobutylene is 0.8 ug/m³ based on 1-hour averaging as the OEL is based on a ceiling limit.

References:

ACGIH. 1992. Documentation of the TLV and BEI for Perfluoroisobutylene

NIOSH Pocket Guide to Chemical Hazards, online, 6/5/2003

Clayton, J. W., 1968, "Fluorocarbon toxicity and biological action," Toxicity of Anesth., Proc. Res. Symp, Williams and Wilkins, Co., Editor: Fink, B.R.

Lehnert, B.E., et al., 1993, "Lung Injury After Acute Inhalation of Perfluoroisobutylene: Exposure Concentration-Response Relationships," Inhalation Toxicology, v. 5:1-32.

cc: Cathy Simon, AQD