MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

March 28, 2003

To: Chemical File for Dibutyl Ether (CAS# 142-96-1)

FROM: Robert Sills, MDEQ-AQD

SUBJECT: Screening Level Development

A review of the available toxicological literature revealed very little information on the toxicity of dibutyl ether (also known as butyl ether, n-butyl ether, di-n-butyl ether, 1-epoxybutane, and 1,1'-oxybis-butane). There is a lack of any occupational exposure limits, EPA RfC or RfD, chronic toxicity studies, or long-term human toxicity information. The RTECS database lists dibutyl ether as a primary irritant, and cites a 1946 study which found that humans exposed to 200 ppm (duration unspecified) had conjunctive irritation of the eyes and an unspecified effects in the nose. RTECS also cites a 1954 study reporting an oral rat LD50 of 7400 mg/kg and an inhalation LCLo in rats at 4000 ppm for 4 hours, noting that, "Details of toxics effects not reported other than lethal dose value." Also cited in RTECS is a 1950 study which reported an inhalation LC50 in mice at 169 gm/m^3 for 15 minutes, with the effect noted as "Behavioral – general anesthetic". On-line searching included Medline, Toxline, and CAS.

According to the NTP database, the molecular weight of dibutyl ether is 130.23; the density is 0.767 g/mL @ 20 C. This source also cites the same human inhalation TCLo, oral rat LD50, and inhalation rat LCLo of 4000 ppm (4 hours) as stated above, without any further details.

Smyth et al. (1970) reported oral rat LD50s alone and in mixtures, for a number of substances. The rats were female albino Wistar rats, weighting between 90 and 120 g (per Smyth et al., 1969). The reported LD50 for butyl ether (presumed to be dibutyl ether) was 14.1 ml/kg. Since the density of dibutyl ether is 0.767 g/mL @ 20 C, the LD50 may be converted to 10,814.7 mg/kg. This LD50 value was used for ITSL development because the studies by Smyth et al. are considered to reliable, even though studies include few details in methodology. The similar yet lower LD50 of 7400 mg/kg and the LC50 cited above are not preferred, due to the age of the studies, the reported lack of detail, and the short duration (15 minutes) for the LC50 study, according to the secondary references.

Utilizing the LD50 of 10,814.7 mg/kg, the ITSL algorithm in Rule 232(1)(h), and default values for body weight and inhalation rate (Butterfield, 1996), results in an **ITSL = 33 ug/m^3 (annual averaging time).**

References:

Butterfield, G. 1996. Default Animal Biological Values, revised Jan. 27, 1993 Memo.

Smyth, H.F., et al. 1969. An Exploration of Joint Toxic Action: Twenty-Seven Industrial Chemicals Intubated in Rats in All Possible Pairs. Tox. Applied Pharm. 14: 340-347.

Smyth, H.F., et al. 1970. An Exploration of Joint Toxic Action. II. Equitoxic Versus Equivolume Mixtures. Tox. Applied Pharm. 17: 498-503.