

**MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY**

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**INTEROFFICE COMMUNICATION**

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October 16, 2000

TO: File for propylene glycol monoethyl ether (1569-02-4)

FROM: Marco Bianchi

SUBJECT: Initial Threshold Screening Level

The Initial Threshold Screening Level (ITSL) for propylene glycol monoethyl ether (PGEE) – CAS Number 1569-02 is 240 µg/m<sup>3</sup> based on an annual averaging time.

Please note: PGEE exists as isomers, or as an undefined molecular structure. PGEE (52125-53-8) is listed by the Chemical Abstract Service (a division of the American Chemical Society) as having an incompletely described structure, while PGEE (1569-02-4) is listed as having a distinct molecular structure comprised of alpha and beta isomers (CAS Helpline, 10/05/00). The review of PGEE was difficult because CAS numbers were not used as identifiers to refer to the exact molecular structure. However, some toxicity studies referred to PGEE as the beta isomer, which according to the Chemical Abstract Service is PGEE (1569-02-4). These studies did provide adequate toxicity data to derive a screening level. The following references or databases were searched to identify data to determine the ITSL: IRIS-online, HEAST, NTP Management Status Report-online, RTECS, EPB-CCD, EPB library, CAS-online, NLM-online, IARC-online, NIOSH Pocket Guide, ACGIH Guide, ATSDR-online, and Patty's Industrial Hygiene and Toxicology.

Patty's Industrial Hygiene and Toxicology (1994), stated that commercial PGEE is a mixture of the alpha and beta isomers, but made no mention of what a typical commercial formulation would be. Vapor generated from commercial grade PGEE is of low order single-dose toxicity, somewhat irritating to the eyes, but not appreciably irritating to the skin.

An unpublished 4-hr rat inhalation study by Dow Chemical showed that propylene glycol monoethyl ether (isomer unspecified) did not cause any deaths in five exposed rats at a 10,000 ppm concentration. The only clinical signs that were observed were marked irritation to the eyes and flares, and that animals became anesthetized at the end of the exposure period.

Smyth et al. (1941) fed PGEEs, alpha and beta, as 50% aqueous solutions to rats and found the LD50s to be 7.11 and 7.00 g/kg, respectively. However, in another study by Smyth et al. (1947), 5 male and 5 female rats were administered only the beta isomer of PGEE in their drinking water for 30-days. Doses ranged from 0.16 to 2.14 g/kg. The daily dose without adverse effects was 0.68 g/kg, while a daily dose of 2.14 g/kg caused

reduced growth. Results from this 30-day drinking water study were also published in an EPA document on the Health Effects Assessment for Glycol Ethers (1984). This document used 0.68 g/kg as a no-observable-effect level (NOEL) to calculate an acceptable subchronic intake of PGEE. This NOEL will also be used to derive the ITSL.

The ITSL was derived as follows:

NOAEL = 0.68 g/kg

WA = body weight of experimental animal in kilograms (kg)

IA = daily inhalation rate of experimental animal in cubic meters/day (m<sup>3</sup>)

b = absorption efficiency by the oral route of exposure

a = absorption efficiency by the inhalation route of exposure

30 = uncertainty factor reduced from 35 due to using a 30-day study rather than a 7-day study.

This uncertainty factor accounts for using a NOAEL for a 30-day exposure period to estimate a NOAEL for a lifetime study.

100 = uncertainty factor; to account for species differences (10) and human population sensitivities (10).

$$\text{ITSL} = \text{NOAEL} / (30 \times 100) \times \text{WA} / \text{IA} \times b / a$$

$$\text{ITSL} = (680 \text{ mg/kg}) / (30 \times 100) \times 1 / (0.945 \text{ m}^3/\text{kg}) \times 1 / 1$$

$$\text{ITSL} = 0.24 \text{ mg/m}^3$$

Conversion of mg/m<sup>3</sup> to µg/m<sup>3</sup>

$$\text{ITSL} = 0.24 \text{ mg/m}^3 \times 1000 \text{ µg/mg} = 240 \text{ µg/m}^3$$

The ITSL for propylene glycol monoethyl ether = 240 µg/m<sup>3</sup> based on annual averaging.

### References:

1. Chemical Abstract Service Helpline. 10/05/00. Telephone conversation to determine molecular structures of PGEE and proper CAS number notation.
2. Symth, HF et al. 1941. The single dose toxicity of some glycols and derivatives. Journal of Industrial Hygiene and Toxicity. 23:6;259-268.
3. Symth, HF et al. 1947. Further experience with the range finding test in the industrial toxicity laboratory, Journal of Industrial Hygiene and Toxicity. 30:1;63-68.
4. United States Environmental Protection Agency. 1984. Health effects assessment for glycol ethers. EPA/540/1-86/052. U.S. Department of Commerce National Technical Information Service publication - P686-134632.

MB:ST

cc: Cathy Simon, AQD

Mary Lee Hultin, AQD

Sheila Biais, AQD