MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

November 20, 2000

TO: File for N,N-Diethyl-1,3-Propanediamine (104-78-9)

FROM: Marco Bianchi, Toxic Unit, Air Quality Division

SUBJECT: Initial Threshold Screening Level

The Initial Threshold Screening Level (ITSL) for N,N-diethyl-1,3-propanediamine is 140 $\mu g/m^3$ based on an annual averaging time. The following references or databases were searched to identify data to determine the ITSL/IRSL: IRIS-online, HEAST, NTP Management Status Report-online, RTECS, EPB-CCD, EPB library, CAS-online, NLM-online, IARC-online, NIOSH Pocket Guide, and ACGIH Guide.

A complete literature search was conducted for N,N-diethyl-1,3-propanediamine, but information was limited to a number of acute toxicity "range-finding" studies performed by Union Carbide (Myers, 1997). Union Carbide has historically conducted a number of these range-finding studies through the work of Smyth, Carpenter, and colleagues from 1944 to 1974. While these tests were limited in scope, they did provide basic toxicological data for hundreds of chemicals. The following studies (Myers, 1997) represent a continuation of the range-finding series for amines.

The amines as a class of compounds produce an array of toxicities depending upon structure, route of exposure, or vapor pressure (Myers, 1997). N,N-diethyl-1,3-propanediamine is classified as a higher aliphatic amine, or an amine having five or more straight-chain carbons and two to five nitrogens. This compound has been shown to cause moderate to high acute toxicity by the oral and percutaneous route of exposure. Results from diluting the aliphatic amines have shown a substantial reduction in the inherent toxicity by the oral route, probably because of attenuation of irritant effects to the gastrointestinal tract. The lower and higher aliphatic amines generally produce well-defined skin and eye irritation, but the higher aliphatic amines were not lethal by exposure to a saturated vapor atmosphere. According to the study investigators (Myers, 1997), this was probably due to vapor pressure as well as the inherent toxicity of the compound.

In the acute oral toxicity test (Myers, 1997), 5 male Wistar rats were dosed by metal gavage with undiluted N,N-diethyl-1,3-propanediamine. Doses were adjusted by a constant factor of two until sufficient mortality data were obtained for an LD_{50} determination. Rats were observed frequently immediately after dosing and at least once a day thereafter, for a 14-day period. Necropsy was performed on all rats to examine for gross pathology. Using mortality data for the 14-day observation period, LD_{50} values and their 95% confidence limits were calculated by the moving average method of Thompson and the tables of Weil. The LD_{50} was calculated to be 0.50 ml/kg (410 mg/kg).

In the acute inhalation toxicity test (Myers, 1997), 6 female Wistar rats were exposed to a static saturated vapor concentration of N,N-diethyl-1,3-propanediamine. Fifty to 100 ml of the test material was placed in a 120-L sealed chamber and the atmosphere allowed to equilibrate for 16 hrs. This saturated concentration equaled 7011 mg/m^3. The animals were then rapidly

introduced into the chamber by means of a gasket drawer-like system designed to minimize vapor loss. Exposure for 8-hrs duration did not kill any animals in this test. Gross pathology revealed no unusual findings in any rat. The saturated concentration of 7011 mg/m^3 will be used as a surrogate LC_{50} to determine the ITSL for N,N-diethyl-1,3-propanediamine.

The ITSL was derived as follows:

Surrogate LC_{50} = 7011 mg/m^3

$$\text{ITSL} = \frac{7011 \text{mg/m}^3}{500 \times 100} = 0.140 \text{ mg/m}^3$$

Conversion of mg/m^3 to μg/m^3

$$\text{ITSL} = 0.140 \text{ mg/m}^3 \times \frac{1000 \text{ μg}}{1 \text{ mg}} = 140 \text{ μg/m}^3$$

The ITSL for N,N-Diethyl-1,3-Propanediamine = 140 μg/m^3 based an annual averaging.

Reference:

1. Myers, RC. 1997. Comparative acute toxicity and primary irritancy of various classes of amines. Toxic Substance Mechanisms. 16:151-193.

MB:ST
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