

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

May 16, 2005

To: Triethylenediamine File (CAS No. 280-57-9)
From: Gary Butterfield
Subject: Screening Level

Triethylenediamine is also known as 1,4-diazabicyclo(2,2,2)octane or TED. This is a solid material with a melting point of 159 degrees Celsius. The boiling point is 174C. It has a molecular weight of 112.2 g/mol. The vapor pressure is reported to be 2.9 mmHg at 50C.

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 (1968 - Jan 2004), National Library of Medicine (NLM) - Toxline, and National Toxicology Program (NTP) Status Report.

The CAS and NLM on-line literature searches were conducted on Jan 21, 2004. An update of the searches was conducted on May 16, 2005 - there were not any recent articles located at this time, either. There are very few toxicity studies available that can be used to calculate a screening level.

In an acute rat LD50 study reported by Goldberg and Johnson (1962), groups of 5 male Carworth rats, 5 to 6 weeks of age and weighing 90 to 120 grams, were dosed in a geometric series. The moving average method of Thompson (1947) was used to determine the LD50. The triethylenediamine was administered as a 5% aqueous solution of commercial grade TED product that was 99% pure. The LD50 was reported to be 1.87 g/kg (+ 1.96SD range of 1.34 to 2.60).

The ITSL based on this LD50 and R232(1)(h) can be calculated as follows.

$$\text{ITSL} = (1870 \text{ mg/kg})/0.167 \times 1/500 \times 1/40 \times 1/100 \times 1\text{kg}/0.9 \text{ m}^3 \times 1000 \text{ ug/mg}$$

$$\text{ITSL} = 6 \text{ ug/m}^3 \text{ annual average}$$

The default rat inhalation rate of 0.9 m³/kg was used in the above calculation. Triethylenediamine is a solid at ambient temperatures, and would exist as an atmospheric particulate. The calculated ITSL of 6 ug/m³ with annual averaging is a value less than EPA's NAAQS for particulate matter. However, a particulate at a concentration of 6 ug/m³ may contribute significantly to a specific locations total ambient particulate concentration causing it to exceed the PM NAAQS.

References: Goldberg and Johnson. 1962. Autonomic ganglion activity and acute toxicologic effects of N,N,N,N-tetramethyl-1,3-butanediamine and triethylenediamine, two foam catalyst amine. Toxicol Appl Pharm 4:522—545.