

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: Memo to File for Triton X-100 (CAS # 9002-93-1)

FROM: Gary Butterfield

DATE: November 21, 2003

SUBJECT: Screening level for Triton X-100 (CAS #9002-93-1)

Triton X-100 is also commonly known as octoxynol and octylphenoxypolyethoxyethanol, among its many other synonyms. This material is a liquid that is used as a wetting agent. The liquid has a specific gravity of 1.084 g/ml. It has a molecular weight of 250.38 g/mol. The melting point is -4 degrees Celsius. The boiling point is 120 degrees Celsius. The vapor pressure is low -- the exact value is not known.

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- May 2003), National Library of Medicine (NLM) - Toxline, and National Toxicology Program (NTP) Status Report.

The CAS and NLM on-line literature searches were conducted on May 5, 2003. During the literature searching there were only two toxicity studies located that potentially could be used to calculate a screening level for Triton X-100. Both of these studies are unpublished in publicly available journals. However, these unpublished studies are available from the EPA ToSCA library. The first one is an acute oral LD50 study by CMA/Proctor and Gamble (1964), which reported the rat LD50 of 1150 mg/kg. The second study was a two-week rat inhalation study reported by Bio/Dynamics, Inc. (1992).

In the acute oral study by CMA/Proctor and Gamble (1964), groups of 10 Charles River rats were administered Triton X-100. The LD50 is reported to be 1.06 ml/kg, which is converted to dose level of 1150 mg/kg using the specific gravity of Triton X-100.

In the two-week inhalation study reported by Bio/Dynamics, Inc. (1992), groups of 5/sex Sprague-Dawley rats were exposed whole body to aerosols of Triton X-100 at concentrations of 0, 5.3 or 10.8 mg/m³ for six hours a day, five days per week. The aerosol had an MMAD of 1.8 µm with a geometric standard deviation of 1.8. The percentage of particles less than 1 µm in diameter (i.e., respirable) was reported to be 17%. Adverse effects were observed at both dose levels of this study. Lung inflammation with greater severity at the higher dose level was observed. Increased lung weights were also observed. Microscopically alveolar/bronchiolar epithelial hyperplasia was observed in all treated

animals and in none of the control animals. Generally, a longer term study and an inhalation study are preferred for use in calculating the screening level over an oral LD50 study. The lung effects reported in the two-week inhalation study are also an indication that there is a route of administration effect. Therefore the two-week inhalation study provides the best basis for setting the screening level. The ITSL can be calculated using the R232(1)(d) equation as follows.

$$\text{ITSL} = \frac{(5.3 \text{ mg/m}^3)}{30 \times 100 \times 3} \times \frac{6}{24} = 0.15 \text{ } \mu\text{g/m}^3 \text{ with annual averaging}$$

The uncertainty factor of 35 for a 7-day study in the equation from R232(1)(d) was changed to a factor of 30, because this study was of a two-week duration. A LOAEL-to-NOAEL factor in the above equation of 3 was included to account for the lung effects observed. The factor of 3 was considered to be appropriate, rather than the standard 10 factor, because increased lung organ weights occurring with hyperplasia are considered to be relatively minor adverse effects, as reported in EPA's 1994 RfC document.

Therefore the ITSL is being set at 0.15 $\mu\text{g/m}^3$ with annual averaging.

References:

Bio/Dynamics, Inc. 1992. A two-week inhalation toxicity study of C-437 and C-1754 (ethoxylated para-tertiary-octyl phenol (CAS# 9002-93-1)) in the rat with cover letter dated 05/24/96 (SANITIZED). EPA NTIS/OTS0573048.

CMA/Proctor and Gamble. 1964. Acute oral toxicity of Triton X-100, with cover letter dated 5/23/96. EPA NTIS/OTS0558734.

EPA. 1994. Methods for Derivation of Inhalation Reference Concentrations and Application of Inhalation Dosimetry. U.S. EPA, Research Triangle Park, NC.