

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

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INTEROFFICE COMMUNICATION

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TO: 1,3,5-Trichloroisocyanuric acid file (CAS # 87-90-1)

FROM: Gary Butterfield

SUBJECT: Screening level for Trichloroisocyanuric acid

DATE: October 17, 2007

Trichloroisocyanuric acid is also known as symclosene, and trichloro-s-triazinetriene among many other names. Trichloroisocyanuric acid is a solid, with a water solubility of 12 g/L. The molecular formula is  $C_3Cl_3N_3O_3$ . The molecular weight is 232.4 g/mol. The melting point is 247C. The vapor pressure at 25C is  $1.2 \times 10^{-7}$  mmHg. Major uses for trichloroisocyanuric acid include chlorinating pools and cooling tower waters. The chlorine molecules are easily released (trichloroisocyanate is highly reactive) when mixed in water to form hypochlorite and isocyanuric acid.

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 - Oct 2007), National Library of Medicine (NLM) - Toxline, and National Toxicology Program (NTP) Status Report.

The CAS and NLM on-line literature searches for this evaluation were conducted on October 8, 2007. The use for pool and cooling tower chlorination has resulted in the EPA giving the chemical a pesticide registration. This material is also an EPA high production volume (HPV) chemical. The HPV website identifies a 2004 robust summary that has been compiled for the EPA by an industry workgroup. The majority of studies had oral exposures, either in drinking water or gavage. There is some concern about using oral study information as a substitute for the inhalation effects of this reactive powder. Therefore inhalation studies are preferred for setting this screening level. Many of the studies in the robust summary were also exposures to either the dichloro- or monochloro-cyanuric acid. The HPV authors appear to consider the toxicity of all chlorinated cyanuric acids (tri-, di-, or mono-) to be similar.

One of the few studies located in the HPV summary that was conducted with trichloroisocyanuric acid was an unpublished acute, four-hour rat inhalation study reported by Toxigenics (1985). In this study trichloroisocyanuric acid exposure was evaluated in Sprague-Dawley rats to concentrations of 0.09 and 0.29 mg/L. Three of five males and three of five females exposed to 0.29 mg/L died during the 14-day observation period. None of the five male or five female rats exposed to 0.09 mg/L died. The LC50 was considered to be greater than 0.09 mg/L, but the exact LC50 was not actually determined by the authors.

A study evaluating the toxicity of the same chemical for which the screening is being established, and a study with inhalation exposure is preferred for setting the screening level. In this case, for the purpose of calculating a screening level for trichloroisocyanuric acid, the 0.09 mg/L exposure concentration from the Toxigenics acute study will be used as a surrogate LC50. The actual LC50, if it were available, would have been greater than 0.09 mg/L as there were no deaths observed at this dose. In addition, use of this surrogate dose level will result in a lower ITSL (more conservative) than if an actual higher LC50 was available. The ITSL can be calculated using the equation for a four-hour LC50 value from R 232(1)(f), as follows.

$$\text{ITSL} = \frac{0.09 \text{ mg/L}}{500 \times 100} = 1.8 \text{ ug/m}^3 \text{ rounded to } 2 \text{ ug/m}^3 \text{ annual average}$$

References:

EPA. 2007. HPV chemical challenge program, at website: [cfpub.epa.gov/hpv%2ds](http://cfpub.epa.gov/hpv%2ds).

Toxigenics. 1985. Four-hour dust inhalation toxicity study in rats of trichloroisocyanuric acid. Toxigenics, Inc., study # 420-1798. As cited in the EPA HPV robust summary.

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