MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File for 1,3,5-triazine-1,3,5(2H,4H,6H)-triethanol (CAS # 4719-04-4)

FROM: Doreen Lehner, Toxics Unit, Air Quality Division

SUBJECT: Screening Level for 1,3,5-triazine-1,3,5(2H,4H,6H)-triethanol (CAS # 4719-04-4)

DATE: February 6, 2015

The initial threshold screening level (ITSL) for 1,3,5-triazine-1,3,5(2H,4H,6H)-triethanol (CAS # 4719-04-4) is 0.015 µg/m^3 with an annual averaging time.

1,3,5-Triazine-1,3,5(2H,4H,6H)-triethanol [TZT] (CAS# 4719-04-4) is also known as: hexahydro-1,3,5-tris(hydroxyethyl)-s-triazine, actane, and busan1060. It is a water soluble viscous yellow or amber colored liquid with a molecular weight of 219.28 g/mol. TZT is a formaldehyde releasing compound. TZT is used: as a finishing agent for polyester fiber; a bactericidal agent in coolant liquids and in metal working fluids; in aqueous-based paint, coating, and latex emulsion products; in water-compensated fuel tanks; in oilfield water systems, drilling muds, and in work over and completion fluids.

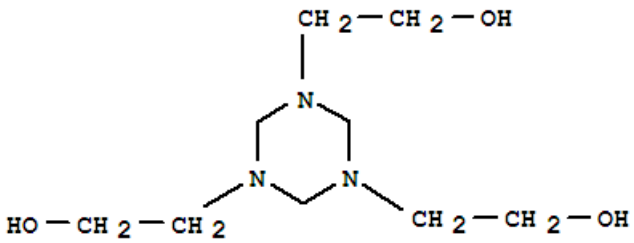

Figure 1. Structure of 1,3,5-Triazine-1,3,5(2H,4H,6H)-triethanol.

A literature review was conducted to determine an initial threshold screening level (ITSL) for TZT. The following references and databases were searched to derive the above screening level: EPBCCD, United States Environmental Protection Agency (US EPA) Integrated Risk Information System (IRIS), National Institute for Occupational Safety and Health (NIOSH), American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values and Biological Exposure Indices (TLV/BEI) 2014 guide, National Toxicology Program (NTP) Study Database, International Agency for Research on Cancer (IARC), Acute Database, Chemical Abstract Service (CAS) Online (searched 12/23/14), National Library of Medicine (NLM)-online, EPA Aggregated Computational Toxicology Resource (ACToR) Database, US EPA TSCATS database, and Hazardous Substances Data Bank (HSDB).

The literature review revealed a relatively limited toxicology dataset. The ITSL is based on a subacute 28-day inhalation study in Wistar rats with liquid aerosol TZT. Ten female and ten male Wistar rats per test group were exposed nose-only to either clean air, 3, 10, 30, or 100 mg/m^3 TZT for 6 hours/day, 5 days/week for 4 weeks (total 20 exposures). The animals

were examined daily for effects. At termination, the animals were necropsied and examined according to OECD test guidelines. All test groups showed some effects of the exposure to TZT. Animals exposed to 100 mg/m^3 TZT showed the following effects: severe clinical findings including labored breathing and respiratory noise; premature death of 5 out of 10 male animals; and for animal welfare reasons the exposure was stopped after study day 6. Animals exposed to 30 mg/m^3 TZT showed the following effects: the larynx contained squamous metaplasia and hyperplasia with erosion and ulceration, as well as necrosis of cartilage; the lung showed epithelial degeneration and BALT increase; and the nasal cavity and trachea showed squamous metaplasia. Rats exposed to 10 and 3 mg/m^3 had the same findings as the rats exposed to higher concentrations, but with decreased incidence and severity. “Under the described study conditions, [a] no observed adverse effect concentration (NOAEC) could not be established” (NTIS, 2011).

Rule 232(1)(d) can be used to determine an ITSL from a subacute inhalation study of 7 days, using the LOAEL of 3 mg/m^3 from the NTIS (2011) study using the following equation. Although the duration of the key study (28 days) is substantially longer than 7 days, it is still far short of chronic or a typical 90-day subchronic study, therefore this ITSL algorithm is the most appropriate method available.

$$ITSL = \frac{LOAEL}{35 \times 100 \times UF} \times \frac{hours\ exposed\ per\ day}{24\ hours\ per\ day} \times \frac{5\ days\ per\ week}{7\ days\ per\ week}$$

$$ITSL = \frac{3\ {}^{mg}/_{m^3}}{35 \times 100 \times 10} \times \frac{6\ hours}{24\ hours} \times \frac{5\ days}{7\ days} = 0.000015306\ {}^{mg}/_{m^3}$$

$$= 0.015306\ {}^{\mu g}/_{m^3}$$

$$ITSL = 0.015\ {}^{\mu g}/_{m^3}$$

Rule 232(2)(c) states that the averaging time for an ITSL derived via this approach is annual. Therefore, the initial threshold screening level (ITSL) for 1,3,5-triazine-1,3,5(2H,4H,6H)-triethanol (CAS # 4719-04-4) is 0.015 µg/m^3 with an annual averaging time.

References:

Act 451 of 1994, Natural Resources and Environmental Protection Act and Air Pollution Control Rules, Michigan Department of Environmental Quality.

NTIS. 2011. 8EHQ-0711-18399A. Notice in Accordance with TSCA Section 8€: Results of a Subacute 28-Day Liquid Aerosol Inhalation Study in Wistar Rats with Protectol HT, (1,3,5-Tris-(2-hydroxyethyl)-1,3,5-hexahydrotriazine), (CAS No. 4719-04-4).

DL:lh