MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File for 1,2,3-Trichlorobenzene (CAS # 87-61-6)

FROM: Robert Sills, AQD Toxics Unit Supervisor

SUBJECT: 1,2,3-Trichlorobenzene ITSL change in the averaging time from 24 hrs to annual

DATE: December 23, 2015

The current ITSL for 1,2,3-Trichlorobenzene (27 ug/m^3) was derived on August 4, 2006 (see attached justification memo). The averaging time (AT) assigned to the ITSL at that time was 24 hours, as per the default methodology at that time (Rule 232(2)(b)). The current file review concludes that the AT may appropriately be set at annual, based on the nature and duration of the key study and the ITSL value derivation, as allowed under Rule 229(2)(b). Therefore, the AT is being changed from 24 hours to annual at this time.

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: 1,2,3-Trichlorobenzene file (CAS # 87-61-6)

FROM: Gary Butterfield

SUBJECT: Screening level for 1,2,3-Trichlorobenzene

DATE: August 4, 2006

1,2,3-Trichlorobenzene is a solid at ambient temperatures, white crystals. This material has a molecular weight of 181.4 g/mol. The melting point is 52C. The boiling point is 219C. The vapor pressure is reported to be 0.13 mmHg at 25C.

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 2006), 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 9, 2006. There were only a few toxicity studies found in the literature search. The rat teratology study reported by Black et al (1988) found no reproductive or fetal effects (fetal NOAEL= 600 mg/kg) at doses lower than those that caused maternal effects (maternal NOAEL=300 mg/kg, LOAEL= 600 mg/kg). The study by Cote et al (1988) reported a rat oral LD50 of 1830 mg/kg, as well as the results of a 90-day feeding study (NOAEL=100 ppm or 7.6 mg/kg).

In the 90-day feeding study reported by Cote et al (1988), groups of 10 male and 10 female Sprague-Dawley rats were fed diets containing 0, 1, 10, 100 or 1000 ppm (converted by authors to 0, 0.08, 0.78, 7.6 or 78 mg/kg for males, and 0, 0.13, 1.3, 12 or 113 for females) 1,2,3-trichlorobenzene. The high dose males had reduced growth, with increased liver and kidney weights. Also at 1000 ppm, there were histological changes in the liver – increased cytoplasmic volume, anisokaryosis of hepatocytes, and fatty infiltration, and histological changes in the thyroid – reduced follicular size, increased epithelial height, and reduced colloid density. Due to the rather qualitative discussion, few details on the incidence of these histological changes were available from this article. The authors reported the NOAEL to be 100 ppm or 7.6 mg/kg.

The 90-day feeding study provides the best basis for establishing the ITSL of the available toxicity information. There is an assumption that there is no route of exposure effect. That is to say, the toxicity observed from oral exposure is the same as would be seen following inhalation exposure. The possibility of using BMDS models for setting the screening level was investigated. However, the lack of there being a clear dose response effect on body weight,

liver weight, and not finding the incidence rates of histopathology changes in this article made BMD methods some what questionable. The statistically significant liver/body weight ratio at the 1000 ppm dose was not significant when actual liver organ weight data was compared to the control liver weight. The biological significance of a slightly increased liver weight also comes into question, when trying to determine if BMD modeling is appropriate. The overall conclusion from these issues is that BMD modeling of this data is not appropriate.

Male rat data (from Cote et al 1988)

Dose ppm	Dose mg/kg/d	weight gain grams	liver weight grams	liver wt/body wt ratio % body wt
0	0	471 ± 54	19.6 ± 2.7	3.5 ± 0.30
1	0.08	447 ± 37	18.8 ± 1.7	3.6 ± 0.22
10	0.78	425 ± 43*	19.3 ± 2.5	3.8 ± 0.29
100	7.6	458 ± 47	19.4 ± 3.1	3.6 ± 0.31
1000	78	423 ± 42*	20.1 ± 2.5	4.0 ± 0.34*

* significantly different from control ($p < 0.05$)

The screening level will be based on the NOAEL of 7.6 mg/kg from Cote et al following EPA's general RfD methodology, as follows.

NOAEL = 7.6 mg/kg

$$RfD = \frac{7.6\ mg/kg}{10x10x10} = 7.6\ ug/kg$$

Where the total uncertainty factor of 1000 came from a factor of 10 for each of the following: sensitive individuals, animal-to-human, and subchronic-to-chronic.

The ITSL can be calculated using standard human breathing rate (20 m^3), and body weight (70 kg).

ITSL = 7.6 ug/kg x (70 kg/20 m^3) = 27 ug/m^3 24 hour average

References

Black et al. 1988. Assessment of teratogenic potential of 1,2,3- 1,2,4- and 1,3,5-trichlorobenzenes in rat. Bull Environ Contam Toxicol 41:719-726.

Cote et al. 1988. Trichlorobenzenes: results of a thirteen week feeding study in the rat. Drug and Chemical Toxicology 11: 11-28.

GB:lh