MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File for Propylene oxide (CAS # 75-56-9)

FROM: Robert Sills, AQD Toxics Unit Supervisor

SUBJECT: Screening levels for Propylene oxide

DATE: September 9, 2015

The screening levels for propylene oxide are as follows:
ITSL = 30 ug/m^3, annual averaging time (AT);
IRSL = 0.3 µg/m^3, annual AT;
SRSL = 3 µg/m^3, annual AT.

The basis for these SLs is the EPA (1994; IRIS) assessment, which reported an inhalation RfC = 30 ug/m^3 and an inhalation unit risk factor of 3.7E-6 per (ug/m^3)$^{-1}$. The ITSL of 30 ug/m^3 was originally established by AQD on 9/20/1990. The AT assigned at that time was 24 hours, as per the default methodology (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 ITSL AT is being changed from 24 hours to annual at this time.

EPA (IRIS; RfC last revised 11/1/90) derived an RfC = 30 ug/m^3 based on Kuper et al. (1988), a 2-year chronic rat bioassay that found a LOAEL(HEC) = 2.9 mg/m^3 with a critical effect of nasal respiratory epithelium effects (nest-like folds). EPA applied a total UF = 100, consisting of UF_H = 10 and a UF of 10 for combined slight adverse effects and for interspecies extrapolation.

EPA (1994) concluded that propylene oxide is classified as, “B2; probable human carcinogen”. EPA (1994) provided an inhalation unit risk = 3.7E-6 per µg/m^3, based on the induction of nasal cavity hemangioma or hemangiosarcoma in mice. Based on this unit risk estimate (URE), the IRSL and SRSL are derived as follows:

$$\text{IRSL} = \frac{1\text{E-}6}{3.7\text{E-}6\ (\mu g/m^3)^{-1}} = 0.27 \sim 0.3\ \mu g/m^3 \text{ (annual AT)}$$

$$\text{SRSL} = \frac{1\text{E-}5}{3.7\text{E-}6\ (\mu g/m^3)^{-1}} = 2.7 \sim 3\ \mu g/m^3 \text{ (annual AT)}$$

References

EPA. 1994. IRIS database. Chemical entry for propylene oxide. Inhalation RfC and Carcinogenicity assessment. Last revised 4/1/94 (carcinogenicity) and 11/1/90 (RfC). Still current as of 9/9/15.

Kuper, C.F., et al. 1988. Chronic inhalation toxicity and carcinogenicity study of propylene oxide in Wistar rats. Food Chem. Toxicol. 26(2): 159-167.