MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY
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INTEROFFICE COMMUNICATION
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TO: File for Acetaldehyde (CAS # 75-07-0)

FROM: Robert Sills, AQD Toxics Unit Supervisor

SUBJECT: Screening levels for Acetaldehyde

DATE: August 18, 2015

The Initial Threshold Screening Level for acetaldehyde is 9 ug/m^3 with an annual averaging time (AT); previously, the AT was set (on 4/25/91) at 24 hrs.
The cancer risk-based screening levels for acetaldehyde were established on 1/13/88. They are as follows:
IRSL = 0.5 µg/m^3, annual averaging time;
SRSL = 5 µg/m^3, annual averaging time.

The basis for the ITSL is the EPA (1991) RfC of 9 ug/m^3. The RfC is based on short-term rat inhalation studies showing a critical effect of degeneration of olfactory epithelium, at a NOAEL = 273 mg/m^3 and a LOAEL = 728 mg/m^3. The NOAEL(ADJ) was 48.75 mg/m^3 and the NOAEL(HEC) was 8.7 mg/m^3 (8700 ug/m^3) for the respiratory effect of a gas in the extrathoracic region (EPA, 1991). Although the key studies involved exposure for only 4 weeks duration, EPA (1991) noted that these studies establish a concentration-response relationship and the same type of lesions was found in chronic studies at higher exposure levels. Therefore, for this chemical the 4-week studies were found to be appropriate for RfC derivation (EPA, 1991). EPA (1991) applied a total uncertainty factor (UF$_T$) = 1000, consisting of UF$_H$ = 10, UF = 10 for uncertainty in the interspecies extrapolation using dosimetric adjustments and to account for the incompleteness of the database, and a UF$_S$ = 10 to account for subchronic to chronic extrapolation. Based on the latter UF applied to a 4-week duration NOAEL, an appropriate AT for the ITSL is annual.

$$\text{ITSL} = \text{RfC} = \frac{\text{NOAEL(HEC)}}{\text{UF}_T} = \frac{8700 \text{ ug/m}^3}{1000} = 8.7 \text{ ug/m}^3 \sim 9 \text{ ug/m}^3 \text{ (annual AT)}$$

EPA (1991) concluded that acetaldehyde is classified as, "B2; probable human carcinogen" based on increased incidence of nasal tumors in male and female rats and laryngeal tumors found in male and female hamsters after inhalation exposure. The basis for the cancer risk SLs is the EPA (1991; IRIS) assessment, which reported an inhalation unit risk factor of 2.2E-6 (ug/m^3)$^{-1}$. EPA (1991) derived this unit risk from the inhalation animal carcinogenicity data and quantitative risk assessment, with a finding of nasal squamous cell carcinoma or adenocarcinoma. Based on this unit risk estimate (URE), the IRSL and SRSL are derived as follows:

$$IRSL = \frac{1E\text{-}6}{2.2E\text{-}6 \; (\mu g/m^3)^{-1}} = 0.5 \; \mu g/m^3 \; (\text{annual AT})$$

$$SRSL = \frac{1E\text{-}5}{2.2E\text{-}6 \; (\mu g/m^3)^{-1}} = 5 \; \mu g/m^3 \; (\text{annual AT})$$

References

EPA. 1991. IRIS database. Chemical entry for acetaldehyde. Inhalation RfC and Carcinogenicity assessment; last revised 10/1/91 and 1/1/91, respectfully. Still current as of 8/18/15.

RS:lh