MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File for Aldrin (CAS No. 309-00-2)

FROM: Mike Depa, Air Quality Division

DATE: September 11, 2015

SUBJECT: Screening Level

The initial risk screening level (IRSL) and secondary risk screening level for Aldrin were established in 1992 from a U.S. Environmental Protection Agency (EPA) inhalation unit risk of 4.9E-3 per µg/m³ (EPA, 1991) as follows:

$$\text{IRSL} = \frac{1\text{E-}6}{4.9\text{E-}3\ (\mu g/m^3)^{-1}} = 0.002\ \mu g/m^3 \text{ (annual averaging time)}$$

$$\text{SRSL} = \frac{1\text{E-}5}{4.9\text{E-}3\ (\mu g/m^3)^{-1}} = 0.02\ \mu g/m^3 \text{ (annual averaging time)}$$

EPA calculated the inhalation unit risk from an oral slope factor of 1.7E+1 per (mg/kg)/day as follows:

Inhalation Unit Risk = Oral Slope Factor x 20m³/70kg
Inhalation Unit Risk = 1.7E+1 per (mg/kg)/day x 20m³/70kg x 1mg/1000µg
Inhalation Unit Risk = 4.857E-3 per µg/m³

EPA used the linearized multistage procedure (extra risk) on liver carcinoma incidence data observed in two oral exposure studies: Davis (1965) and NCI (1978).

Aldrin (95% pure) was administered in the diet to 50 male and 50 female B6C3FI mice at TWA doses of 4 and 8 ppm or 3 and 6 ppm. Treatment was for 80 weeks, and animals were observed for an additional 10 to 13 weeks (NCI, 1978). In male mice, there was a significant dose-related increase in hepatocellular carcinomas when compared with matched or pooled controls. (Entire paragraph is an excerpt from EPA, 1991.)

Body weights for mice were assumed to be 0.03 kg for purposes of dose conversion. The above data sets were used for calculation of the following slope factors: 2.3E+1 per (mg/kg)/day for female C3H mice, 1.8E+1 per (mg/kg)/day for male C3H mice, and 1.2E+1 per (mg/kg)/day for male B6C3F1 mice. No strain or sex specificity was noted in the studies, since aldrin treatment induced liver tumors in all mouse strains tested. A geometric mean of 1.7E+1 per (mg/kg)/day was thus chosen for the quantitative estimate, since all three slope factors were very similar. (Entire paragraph is an excerpt from EPA, 1991.)

Table 1. Incidence of Liver Carcinoma* (from EPA, 1991)

Administered Dose (ppm)	Human Equivalent Dose (mg/kg-day)	Tumor Incidence	Reference
Females			Davis, 1965 reevaluated by Reuber (cited in Epstein, 1975)
0	0	2/53	
10	0.104	72/85	
males			NCI, 1978
0	0	22/73	
10	0.104	75/91	
0	0	3/20	
4	0.04	16/49	
8	0.08	25/45	

* mouse/C3H (Davis, 1965) and mouse/B6C3F1, male (NCI, 1978)

References

Davis, K.J. 1965. Pathology report on mice fed dieldrin, aldrin, heptachlor, or heptachlor epoxide for two years. Internal FDA memorandum to Dr. A.J. Lehrman, July 19.

EPA. 1991. Environmental Protection Agency (EPA) Integrated Risk Information System (IRIS). Aldrin. <accessed 9-11-15> http://www.epa.gov/iris/subst/0130.htm#doscarinhal

Epstein, S.S. 1975. The carcinogenicity of dieldrin. Part 1. Sci. Total Environ. 4: 1-52.

NCI (National Cancer Institute). 1978. Bioassays of aldrin and dieldrin for possible carcinogenicity. DHEW Publication No. (NIH) 78-821. NCI Carcinogenesis Tech. Rep. Ser. No. 21. NCI-C6-TR-21.