

MICHIGAN DEPARTMENT OF ENVIRONMENTAL QUALITY

INTEROFFICE COMMUNICATION

TO: File for Benzene (CAS # 71-43-2)
FROM: Robert Sills, AQD Toxics Unit Supervisor
SUBJECT: Initial Risk and Secondary Risk Screening Levels for Benzene
DATE: August 14, 2015

The cancer risk-based screening levels for benzene were established on 10/9/1987. They are as follows:

IRSL = 0.1 $\mu\text{g}/\text{m}^3$, annual averaging time;
SRSL = 1 $\mu\text{g}/\text{m}^3$, annual averaging time.

EPA (2000; IRIS) classified benzene as a “known” human carcinogen, “based upon convincing human evidence as well as supporting evidence from animal studies...Epidemiologic studies provide clear evidence for a causal association between exposure to benzene and acute nonlymphocytic leukemia (ANLL) and also suggest evidence for chronic nonlymphocytic leukemia (CNLL) and chronic lymphocytic leukemia (CLL)” (EPA, 2000). EPA (2000) reported an inhalation unit risk factor range of 2.2E-6 to 7.8E-6 (ug/m^3)⁻¹. EPA (2000) explained that, “When a linear model was employed, the choice of risk estimates narrows” to this range, depending on which exposure measurements were used from the key occupational epidemiology studies. “The set of risk estimates falling within this interval reflects both the inherent uncertainties in the risk assessment of benzene and the limitations of the epidemiologic studies in determining dose-response and exposure data” (EPA, 2000). Given this range and uncertainty, AQD has utilized the high end of the EPA (2000) unit risk range (i.e., 7.8E-6 (ug/m^3)⁻¹) for purposes of deriving risk-based screening levels. Based on this unit risk estimate, the IRSL and SRSL are derived as follows:

$$\text{IRSL} = \frac{1\text{E-6}}{7.8\text{E-6 } (\mu\text{g}/\text{m}^3)^{-1}} = 0.13 \text{ ug}/\text{m}^3 \sim 0.1 \mu\text{g}/\text{m}^3 \text{ (annual AT)}$$

$$\text{SRSL} = \frac{1\text{E-5}}{7.8\text{E-6 } (\mu\text{g}/\text{m}^3)^{-1}} = 1.3 \text{ ug}/\text{m}^3 \sim 1 \mu\text{g}/\text{m}^3 \text{ (annual AT)}$$

References

EPA. 2000. IRIS database. Chemical entry for dieldrin. Carcinogenicity assessment. Last revised 1/19/2000. Still current as of 8/13/15.

RS:lh