

**AMBIENT SURFACE WATER QUALITY  
STANDARDS DOCUMENTATION****CHEMICAL:** Tetrachloroethylene**CAS NO. (s):** 127-18-4**BASIS (Human/Aquatic):** Human**WATER CLASSIFICATION:** AA; AA-s; A; A-s**STANDARD:** 0.7 ug/l **Note A****REMARKS:****SUMMARY INFORMATION:**

The toxicologic data base for this compound has been reviewed.<sup>1-5</sup> It is an animal oncogen as defined in Part 701.1(p). Chronic exposure of laboratory animals to gavage doses of this compound has resulted in a significant increase in the incidence of liver tumors in male and female mice.<sup>6</sup> A completed but as yet unreleased bioassay sponsored by the National Toxicology Program has confirmed the liver oncogenicity of tetrachloroethylene in mice. The standard may be modified once the results of this bioassay are available for review.

**STANDARD DERIVATION:**

Dose-response data from a National Cancer Institute<sup>6</sup> carcinogenesis bioassay were used for extrapolation. Using the protocol in Part 701.4 and a linearized multistage extrapolation procedure (GLOBAL82)<sup>7</sup>, a tetrachloroethylene concentration of 0.7 ug/l in water was calculated to correspond to an increased human cancer risk of  $1 \times 10^{-6}$  over a lifetime (see calculations below). The recommended ambient water quality standard for tetrachloroethylene is 0.7 ug/l.

**Calculations:****1. National Cancer Institute Bioassay Data**

The incidence of liver tumors in male mice given time-weighted average doses of 0, 536, and 1,070 mg/kg of tetrachloroethylene via gavage on 5 days each week during the exposure period is the dose-response data for the most sensitive tumor type in the most sensitive species and sex, occurring at a statistically significant level.

2. Average Daily Intake (for animals)\*

Average Daily Intake  
During Lifetime

0 mg/kg/day  
333 mg/kg/day  
665 mg/kg/day

\*Exposure was for 5 days a week, therefore, time-weighted average doses on treatment days were multiplied by 5/7 to calculate average daily doses during exposure. In addition, mice lived an additional 12 weeks without exposure after being exposed for 78 weeks; therefore, average daily doses during exposure were multiplied by 0.87 to calculate average daily doses during lifetime.

3. Data Input for GLOBAL82 Computer Program

<u>Dose</u> <u>(mg/kg/day)</u>	<u>Number of animals</u> <u>with tumors</u>	<u>Number of</u> <u>experimental animals</u>
0	2	20
333	32	49
665*	27*	48*

\*Since the dose-response data indicate that the number of responders reached a plateau at an average daily dose of 333 mg/kg/day, the data from the highest dose level were omitted from input into the GLOBAL82 program.

4. GLOBAL82 Result (for animals)

The lower 95% confidence limit value of the tetrachloroethylene dose corresponding to an increased lifetime cancer risk of  $1 \times 10^{-6}$  for the experimental animals was 0.25 ug/kg/day.

5. Conversion of the animal dose (ug/kg/day) to a human dose using surface area conversion rule

$$\text{rodent dose (ug/kg/day)} \times \left( \frac{\text{animal body wt. (kg)}}{\text{human body wt. (kg)}} \right)^{0.33} = \text{human dose (ug/kg/day)}$$

$$0.25 \text{ ug/kg/day} \times \left( \frac{0.03 \text{ kg}}{70 \text{ kg}} \right)^{0.33} = 1.9 \times 10^{-2} \text{ ug/kg/day}$$

6. Calculation of the tetrachloroethylene level in water corresponding to an increased cancer risk of  $1 \times 10^{-6}$  for a 70 kg human ingesting 2 liters of contaminated water per day over a lifetime.

$$\frac{0.019 \text{ ug/kg/day} \times 70 \text{ kg}}{2 \text{ l/day}} = 0.66 \text{ ug/l}$$

REFERENCES:

- (1) National Academy of Sciences. 1977. Drinking Water and Health, Vol. 1. National Academy Press. Washington, D.C.
- (2) National Academy of Sciences. 1980. Drinking Water and Health, Vol. 3. National Academy Press. Washington, D.C.
- (3) National Academy of Sciences. 1983. Drinking Water and Health, Vol. 5. National Academy Press. Washington, D.C.
- (4) International Agency for Research on Cancer. 1979. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. 20: 491-514.
- (5) U.S. Environmental Protection Agency. 1980. Ambient Water Quality Criteria for tetrachloroethylene. NTIS No. PB81-117830.
- (6) National Cancer Institute. 1977. Bioassay of tetrachloroethylene for possible carcinogenicity. Carcinogenesis Tech. Rep. Ser. No. 13.
- (7) Howe, R.B. and K.S. Crump. 1982. GLOBAL82 Computer Program. Science Research Systems, Inc., Ruston, LA.

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