

Fact Sheet Date: March 12, 1998

**NEW YORK STATE
HUMAN HEALTH FACT SHEET**

**Ambient Water Quality Value for
Protection of Sources of Potable Water**

SUBSTANCE: 1,1,2-Trichloroethane

CAS REGISTRY NUMBER: 79-00-5

AMBIENT WATER QUALITY VALUE: 1 micrograms/liter (1 ug/L)

BASIS: Oncogenic Effects

INTRODUCTION

The physical, chemical and toxicological properties of 1,1,2-trichloroethane have been reviewed (ATSDR, 1989; US EPA, 1980, 1990, 1992, 1995). The following ambient water quality values were derived using these and other references and the procedures outlined in 6 NYCRR 702.2 through 702.7.

SPECIFIC MCL AND PRINCIPAL ORGANIC CONTAMINANT CLASS (702.3)

1,1,2-Trichloroethane does not have a Specific MCL (maximum contaminant level) as defined in 6 NYCRR 700.1 and is in principal organic contaminant class I as defined in 6 NYCRR 700.1. Therefore, a water quality value of 5 ug/L can be derived based on 6 NYCRR 702.3(b).

ONCOGENIC EFFECTS (702.4)

1,1,2-Trichloroethane induced hepatocellular carcinomas and adrenal gland pheochromocytomas in mice exposed five days a week for 18 months and observed for an additional 3 months, but was not carcinogenic in rats under similar conditions (NCI, 1978). 1,1,2-Trichloroethane was active in short-term tests indicative of potential oncogenic activity (e.g., neoplastic transformation, enzyme-altered foci, hepatocyte primary culture/DNA

repair, chromosome malsegregation and covalent DNA binding) (Crebelli et al., 1988; DiRenzo et al., 1982; Milman et al., 1988). Based on the chronic and short-term tests, 1,1,2-trichloroethane is an oncogen under 6 NYCRR 700.1.

In 1980, the U.S. EPA evaluated the dose-response data for 1,1,2-trichloroethane and calculated a cancer potency factor of 0.057 per milligram per kilogram of body weight per day ($0.057 \text{ (mg/kg/day)}^{-1}$) (Exhibit 1, taken from US EPA, 1995), using procedures consistent with those outlined in paragraphs (a) through (e) of 6 NYCRR 702.4, including the linearized multistage model (702.4(a)). This factor is based on liver tumors in male mice, which is the most sensitive oncogenic response in rodents. It was calculated by the U.S. EPA using a cross-species scaling factor for carcinogen risk assessment based on the assumption that lifetime cancer risks are equal when daily administered doses are in proportion to body weights raised to the $2/3$ power (the surface area scaling factor). Proposed New York State regulations state that the scaling factor should be based on the assumption that lifetime cancer risks are equal when daily administered doses are in proportion to body weights raised to the $3/4$ power. This change requires application of an adjustment factor to cancer potency factors calculated using a cross-species scaling factor based on surface area.

The water concentration corresponding to the lower bound estimate on the dose associated with an excess lifetime human cancer risk of one-in-one million is 1 ug/L, based on the adjusted cancer potency factor of $0.030 \text{ (mg/kg/day)}^{-1}$ and the procedure in paragraph (f) of 6 NYCRR 702.4. The adjusted cancer potency factor was calculated by multiplying the U.S. EPA cancer potency factor of $0.057 \text{ (mg/kg/day)}^{-1}$ by 0.53 (the adjustment factor for a mouse body weight of 0.033 kg).

NON-ONCOGENIC EFFECTS (702.5)

1,1,2-Trichloroethane damages the liver, kidneys, gastrointestinal tract, central nervous system and skin of laboratory animals (ATSDR, 1989; US EPA, 1980, 1989, 1995) and depresses the humoral immune status in mice (Sanders et al., 1985; White et al., 1985). In 1988, the U.S. EPA established an oral reference dose (equivalent to an acceptable daily intake) of 4.0 micrograms per kilogram of body weight per day (4.0 ug/kg/day) (rounded from 3.9 ug/kg/day) for 1,1,2-trichloroethane (Exhibit 2, taken from US EPA, 1995), using procedures consistent with those outlined in paragraphs (a) and (b) of 6 NYCRR 702.5. This reference dose was derived by application of a 1,000-fold uncertainty factor to a no-observed-effect level of 3.9 mg/kg/day for clinical serum chemistry effects (indicative of liver damage) in female mice exposed for 90 days via drinking water (Sanders et al., 1985; White et al., 1985). A value of 28 ug/L is derived using the procedure outlined in paragraph (e) of 6 NYCRR 702.5 and allowing 20% of the acceptable daily intake to come from drinking water (6 NYCRR 702.5(c)).

CHEMICAL CORRELATION (702.7)

A value based on chemical correlation was not derived because there were sufficient data

to derive values based on oncogenic (6 NYCRR 702.4) and non-oncogenic (6 NYCRR 702.5) effects.

OTHER STANDARDS AND GUIDELINES

Under New York State Department of Health regulations for drinking-water standards (10 NYCRR Part 5), 1,1,2-trichloroethane is a principal organic contaminant (POC) and has a MCL of 5 ug/L. Under the Safe Drinking Water Act, the federal maximum contaminant level goal (MCLG) for 1,1,2-trichloroethane is 3 ug/L (rounded from 2.8 ug/L) (US EPA, 1992), assuming a 70-kg adult drinks 2 L/day, allocating 20% of the U.S. EPA reference dose (4.0 ug/kg/day) to drinking water and applying an additional uncertainty factor of 10 for possible oncogenic effects. The federal MCL is 5 ug/L, based on analytical considerations (US EPA, 1992).

SELECTION OF VALUE

According to 6 NYCRR 702.2(b), the selected ambient water quality value shall be the most stringent of the values derived using the procedures found in 6 NYCRR 702.3 through 702.7. This value is 1 ug/L (based on oncogenic effects) and is the value selected as the water quality value for 1,1,2-trichloroethane.

REFERENCES

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SEARCH STRATEGY: ON-LINE TOXICOLOGIC DATABASE

Toxline (1981 to March, 1995) was searched linking the CAS Registry Number of 1,1,2-trichloroethane with the keyword "toxicity."

Bureau of Toxic Substance Assessment/prt01&kmm12
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