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: Dibromochloropropane (DBCP) **CAS REGISTRY NUMBER:** 96-12-8

AMBIENT WATER QUALITY VALUE: 0.04 micrograms/liter (0.04 ug/L)

BASIS: Oncogenic Effects

INTRODUCTION

The physical, chemical, and toxicological properties of dibromochloropropane (DBCP or 1,2-dibromo-3-chloropropane) have been reviewed (ATSDR, 1992; US EPA, 1979, 1985a,b, 1987, 1989, 1991). 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)

Dibromochloropropane has a Specific MCL of 0.2 ug/L as defined in 6 NYCRR 700.1. This is a maximum contaminant level for drinking water established by the New York State Department of Health under the State Sanitary Code (10 NYCRR Part 5, Public Water Systems). Therefore, a water quality value of 0.2 ug/L (the Specific MCL) can be derived based on 6 NYCRR. Dibromochloropropane is also in principal organic contaminant class i as defined in 6 NYCRR 700.1. However, 6 NYCRR 702.3 requires that the value from this section be based on the Specific MCL of 0.2 ug/L.

ONCOGENIC EFFECTS (702.4)

Dibromochloropropane induces mammary adenocarcinomas, renal carcinomas, hepatocellular carcinomas and splenic hemangiomas in rats, and squamous cell carcinomas of the forestomach in both rats and mice (NCI, 1978; US EPA, 1979, 1985a) and is an oncogen under 6 NYCRR 700.1. The U.S. EPA (1985a) evaluated the

dose-response data for dibromochloropropane and calculated a cancer potency factor of 1.4 per milligram per kilogram body weight per day (1.4 $(mg/kg/day)^{-1}$) using procedures consistent with those outlined in paragraphs (a) through (e) of 6 NYCRR 702.4, including a linearized multistage model (extra risk). This cancer potency factor 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 adjusted human cancer risk of one-in-one million is 0.04 ug/L. This value was derived using the adjusted cancer potency factor (0.90 $(mg/kg/day)^{-1}$) and the procedure in paragraph (f) of NYCRR 702.4. The adjusted cancer potency factor was calculated by multiplying the U.S. EPA cancer potency factor of 1.4 $(mg/kg/day)^{-1}$ by 0.64 (the adjustment factor for a rat body weight of 0.35 kg). Although U.S. EPA (1985a) did not provide the dose-response data used to derive their cancer potency value, an identical value is derived using the dose-response data for kidney tumors in 0.35-kg male rats (0/48, 1/46, 4/46 and 15/41 at doses of 0, 0.20, 0.68 and 2.0 mg/kg/day) (US EPA, 1979, 1985a). This is the most sensitive response in male rats.

NON-ONCOGENIC EFFECTS (702.5)

Dibromochloropropane damages the blood, liver, kidneys, gastrointestinal tract, central nervous system and testes of laboratory animals (ATSDR, 1992; Foote et al., 1986a,b; US EPA, 1985a,b, 1987). Reduced spermatogenesis has been observed in men occupationally exposed to dibromochloropropane (US EPA, 1985a,b). The U.S. EPA has not established an oral reference dose (equivalent to an acceptable daily intake) for dibromochloropropane (US EPA, 1995). A no-observed-effect level of 250 micrograms per kilogram body weight per day (250 ug/kg/day) for increased kidney weights was reported in female rats exposed, via food, for 90 days (Torkelson et al., 1961). If an uncertainty factor of 1,000 is applied to this dose, an oral reference dose of 0.25 ug/kg/day can be derived using procedures consistent with those outlined in paragraphs (a) and (b) of 6 NYCRR 702.5. An uncertainty factor of 1,000 was used to account for human variability, differences between animals and humans, and the use of a subchronic study to derive the reference dose. A value of 1.8 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 is not applicable because data are sufficient to

evaluate dibromochloropropane based on both of the sections 6 NYCRR 702.4 and 702.5.

OTHER STANDARDS AND GUIDELINES

Under the Safe Drinking Water Act, the federal maximum contaminant level goal (MCLG) for dibromochloropropane is zero and the maximum contaminant level goal (MCL) is 0.2 ug/L, based on analytical considerations (US EPA, 1991). Under the New York State Department of Health regulations for drinking-water standards (10 NYCRR Part 5), the Specific MCL for dibromochloropropane is also 0.2 ug/L.

The World Health Organization (WHO) guideline value for dibromochloropropane in drinking water is 1 ug/L, based on a lifetime excess cancer risk of one-in-one hundred thousand (WHO, 1993). Although the WHO value is based on the same data and low-dose extrapolation model as the U.S. EPA value, the WHO did not use the trans-species conversion factor based on surface area but assumed that animals and humans exposed to the same dose per unit body weight (e.g., mg/kg/day) have the same cancer risk.

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 0.04 ug/L (based on oncogenic effects) and is the value selected as the water quality value for dibromochloropropane.

REFERENCES

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WHO (World Health Organization). 1993. Guidelines for Drinking-Water Quality, 2nd Edit., Vol. 1: Recommendations. Geneva, Switzerland: World Health Organization.

SEARCH STRATEGY: ON-LINE TOXICOLOGIC DATABASE

Toxline (1981 to May, 1995) was searched linking the CAS Registry number of dibromochloropropane with the keyword "toxicity."

Bureau of Toxic Substance Assessment/htn02&kmm12

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