NEW YORK STATE
- HUMAN HEALTH FACT SHEET -

Ambient Water Quality Value for
Protection of Sources of Potable Water

SUBSTANCE: epsilon-Hexachlorocyclohexane  CAS REGISTRY NUMBER: 6108-10-7

AMBIENT WATER QUALITY VALUE: 0.04 ug/L

BASIS: Chemical Correlation to Oncogenic

I  INTRODUCTION

The Ambient Water Quality Value applies to the water column and is designed to protect humans from the effects of contaminants in sources of drinking water; it is referred to as a Health (Water Source) or H(WS) value. Regulations (6 NYCRR 702.2) require that the water quality value be based on the procedures in sections 702.3 through 702.7. A previous fact sheet supported a value of 0.02 ug/L for surface water for hexachlorocyclohexane (HCH) and the sum of isomers alpha-HCH, beta-HCH, gamma-HCH, delta-HCH and epsilon-HCH (NYS, 1985). Available information on epsilon-HCH published after 1985 was examined as described in "Scope of Review," below. Potential water quality values are derived below, and the value of 0.04 ug/L selected as described under "Selection of Value."

II  PRINCIPAL ORGANIC CONTAMINANT CLASSES AND SPECIFIC MCL (702.3)

A. Discussion

epsilon-Hexachlorocyclohexane does not have a New York State Specific MCL as defined in 700.1. However, epsilon-hexachlorocyclohexane is in a principal organic contaminant class (vi) as defined in 700.1.

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The U.S. Environmental Protection Agency has not established a maximum contaminant level goal (MCLG) or a MCL for drinking water for epsilon-hexachlorocyclohexane.

Under the State Sanitary Code (10 NYCRR Part 5, Public Water Supplies), the New York State Department of Health has established a general maximum contaminant level of 5 ug/L for principal organic contaminants such as epsilon-hexachlorocyclohexane in drinking water.

B. Derivation of Water Quality Value

Because epsilon-hexachlorocyclohexane is in a principal organic contaminant class and has no Specific MCL, a water quality value of 5 ug/L can be derived based on 702.3(b).

III ONCOGENIC EFFECTS (702.4)


There are no oncogenic data on which to base a quantitative risk assessment. However, Goto et al. (1972) reported benign and malignant liver tumors in ICR-JCl mice after 26 weeks of exposure to a diet containing 600 ppm of a mixture of delta-hexachlorocyclohexane and epsilon-hexachlorocyclohexane. The study was inadequately reported and the exact number of animals with tumors was unclear.

IV NON-ONCOGENIC EFFECTS (702.5)

There are no non-oncogenic data on which to base a quantitative risk assessment.

V CHEMICAL CORRELATION (702.7)

A. Data

The toxicologic database for epsilon-hexachlorocyclohexane has been reviewed (ATSDR, 1997; Goto et al., 1972; IARC, 1979). Although there are limited data on its non-oncogenic and oncogenic effects, the data are not sufficient for establishing a specific water quality value on the basis of sections 702.4 or 702.5.
The chemical structure, metabolic pathways, and target organs of five hexachlorocyclohexane isomers (alpha, beta, gamma, delta and epsilon) are similar (ATSDR, 1997); moreover, all have oncogenic potential in mice (see reviews in ATSDR, 1997; IARC, 1979). The collective evidence from studies on the oncogenic potential of individual isomers (alpha, beta, gamma, and delta) and mixtures of isomers (including mixtures of delta and epsilon) indicate that the potency of alpha-hexachlorocyclohexane to induce oncogenic effects in the liver of mice is greater than that of the other isomers (Hanada et al., 1973; Ito et al., 1973a,b). However, the evidence is not sufficient to rank the relative potencies of beta-, gamma-, delta-, and epsilon-hexachlorocyclohexane (Hanada et al., 1973; Ito et al., 1973a,b).

B. Derivation of Water Quality Value

Three hexachlorocyclohexane isomers (alpha-hexachlorocyclohexane, beta-hexachlorocyclohexane, and gamma-hexachlorocyclohexane) are classified as animal oncogens under 6 NYCRR 700.1; their ambient water quality values based on oncogenic effects are 0.01 ug/L, 0.04 ug/L, and 0.05 ug/L, respectively (NYS, 1997a,b,c). Given the similarities of the hexachlorocyclohexane isomers and the available data that indicates that the potency of alpha-hexachlorocyclohexane to induce oncogenic effects in mice is greater than that of the other isomers, an ambient water quality value of 0.04 ug/L is derived for epsilon-hexachlorocyclohexane based on its chemical correlation to other hexachlorocyclohexanes, specifically beta-hexachlorocyclohexane and gamma-hexachlorocyclohexane. The value was based on the geometric mean of the values for beta- and gamma-hexachlorocyclohexane (as shown below) because of the uncertainties regarding the relative oncogenic potency of epsilon-hexachlorocyclohexane compared to beta- and gamma-hexachlorocyclohexane.

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\text{Water Quality Value} = \left[ (0.04 \text{ ug/L})(0.05 \text{ ug/L}) \right]^{0.5} = 0.045, \text{ rounded to 0.04 ug/L}
\]

VI SELECTION OF VALUE

The H(WS) value is designed to protect humans from oncogenic and non-oncogenic effects from contaminants in sources of drinking water. To protect from these effects, regulations (6 NYCRR 702.2(b)) require that the value be the most stringent of the values derived using the procedures found in sections 702.3 through 702.7. The chemical correlation value of 0.04 ug/L (6 NYCRR 702.7) is the most stringent value derived by these procedures and is the ambient water quality value for epsilon-hexachlorocyclohexane.
VII REFERENCES


**VIII SCOPE OF REVIEW**

Several of the widely-recognized sources listed below can provide a comprehensive review and often a quantitative assessment of the toxicity of a substance. These sources were searched for information on epsilon-HCH; where none was found it is so noted.

- RTECS (Registry of Toxic Effects of Chemical Substances). On-line database (substance not on RTECS).
- CCRIS (Chemical Carcinogenesis Research Information System). On-line database (substance not on CCRIS).
- ATSDR (Agency for Toxic Substances and Disease Registry) toxicological profile (document not found).
- IARC (International Agency for Research on Cancer) Monographs Supplement 7 (substance not listed).
- U.S. EPA ambient water quality criteria document (document not found).
- U.S. EPA health advisory (document not found).
- U.S. EPA drinking water criteria document (document not found).

The sources below were reviewed by NYSDOH (1985).

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The sources above are deemed adequate to assess the literature through 1994.