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: Chlordane **CAS REGISTRY NUMBER:** 57-74-9

AMBIENT WATER QUALITY VALUE: 0.05 ug/L

BASIS: 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. Potential water quality values are derived below, and the value of 0.05 ug/L is selected for chlordane as described under "Selection of Value."

II PRINCIPAL ORGANIC CONTAMINANT CLASSES AND SPECIFIC MCL (702.3)

A. Discussion

Chlordane has a Specific MCL of 2 ug/L as defined in 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 Supplies). Chlordane is not in a principal organic contaminant class as defined in 700.1.

The U.S. Environmental Protection Agency has established a maximum contaminant level goal (MCLG) of zero ug/L and a MCL of 2 ug/L for drinking water for chlordane.

B. Derivation of Water Quality Value

Regulations require that the water quality value for chlordane not exceed the Specific MCL of 2 ug/L.

III ONCOGENIC EFFECTS (702.4)

U.S. EPA (1995) conducted a comprehensive evaluation of the oncogenic effects of chlordane as part of its criteria development for the Great Lakes Water Quality Initiative (GLI). The GLI was a joint undertaking by U.S. EPA and the Great Lakes States and included representatives of interest groups. Its final regulations and the criteria document for this substance received extensive public review in a formal rule making process. U.S. EPA's documentation for their oncogenic criteria has been reviewed. The Department concludes that chlordane is an oncogen under New York's definition in 6 NYCRR 700.1 and that U.S. EPA's toxicological basis is appropriate for derivation of a statewide value.

Exhibit I, excerpted from U.S. EPA (1995; 1996), provides U.S. EPA's scientific basis for their criteria. These data will be used to calculate a water quality value for protection from oncogenic effects using New York State procedures as described below.

U.S. EPA (1995) selected the results of the NCI (1977) and Velsicol (1973) bioassays as the most appropriate dose-response data for deriving a water quality value. A summary of the data sets showing statistically and biologically significant increases in tumor response is presented in Exhibit I. U.S. EPA derived an oral cancer slope factor of 1.3 $[mg/(kg \cdot day)]^{-1}$ from the geometric mean of four separate slope factors from the above key studies.

This slope factor was calculated by U.S. EPA using an interspecies scaling of doses based on the 2/3 power of relative body weights. Proposed New York State regulations call for such scaling to be done on the basis of the 3/4 power of relative body weights. An adjustment to U.S. EPA's slope is needed to account for the different scaling methods.

The adjustment factor for mouse data (body weight of 0.030 kg) is a multiplication factor of 0.52, which results in a slope of 0.676 $[mg/(kg \cdot day)]^{-1}$.

This slope factor is converted to a human dose, at a lifetime risk level of one-in-one million as shown below.

$$\text{Human dose} = \frac{\text{risk}}{\text{slope}} = \frac{10^{-6}}{0.676\ [\text{mg}/(\text{kg} \cdot \text{day})]^{-1}}$$

$$= 1.48 \times 10^{-6}\ \text{mg}/(\text{kg} \cdot \text{day}) \equiv 1.48 \times 10^{-3}\ \text{ug}/(\text{kg} \cdot \text{day})$$

The human dose above is converted to a potential water quality value based on a 70 kg adult consuming 2 liters of water per day as follows:

$$\text{Water Quality Value} = \frac{[1.48 \times 10^{-3}\ \text{ug}/(\text{kg} \cdot \text{day})]\ [70\ \text{kg}]}{[2\ \text{L/day}]} = 0.0518\ \text{ug/L},$$ rounded to 0.05 ug/L

IV NON-ONCOGENIC EFFECTS (702.5)

U.S. EPA (1995) also conducted a comprehensive review of toxicological data on non-oncogenic effects for chlordane as part of criteria development under GLI. The Department reviewed the toxicological basis for EPA's non-oncogenic criteria and concludes it is appropriate for the derivation of a statewide value. Exhibit II, excerpted from U.S. EPA (1995), provides the scientific basis for their non-oncogenic criteria. These data will be used to develop a water quality value for protection from non-oncogenic effects using New York State procedures as described below.

U.S. EPA (1995) selected the results of the study by Velsicol (1983a) as the most appropriate for deriving a water quality value based on non-oncogenic effects. From these results they calculated an acceptable daily exposure (ADE) of 5.5×10^{-5} mg/(kg · day), equivalent to an acceptable daily intake (ADI) developed under NYS procedures (702.5).

A potential water quality value is calculated from the ADI, above, based on a 70 kg adult consuming 2 liters of water per day and allocating 20% of the ADI to drinking water, as follows:

$$\text{Water Quality Value} = \frac{[5.5 \times 10^{-5}\ \text{mg}/(\text{kg} \cdot \text{day})]\ [1000\ \text{ug/mg}]\ [70\ \text{kg}]\ [0.2]}{[2\ \text{L/day}]} = 0.4\ \text{ug/L}$$

V CHEMICAL CORRELATION (702.7)

A value based on chemical correlation is not applicable because data are sufficient to evaluate chlordane based on sections 702.4 and 702.5.

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 for 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 oncogenic value of 0.05 ug/L (6 NYCRR 702.4) is the most stringent value derived by these procedures and is the ambient water quality value for chlordane.

VII REFERENCES

6 NYCRR (New York State Codes, Rules and Regulations). Water Quality Regulations, Surface Water and Groundwater Classifications and Standards: Title 6 NYCRR, Chapter X, Parts 700-705. Albany, NY: New York State Department of Environmental Conservation.

10 NYCRR (New York State Codes, Rules and Regulations). Public Water Systems: Title 10 NYCRR, Chapter 1, State Sanitary Code, Subpart 5-1. Albany, NY: New York State Department of Health, Bureau of Public Water Supply Protection.

U.S. EPA (Environmental Protection Agency). 1995. Great Lakes Water Quality Initiative Criteria Documents for the Protection of Human Health. Washington, D.C.: Office of Water. EPA-820-B-95-006.

U.S. EPA (Environmental Protection Agency). 1996. Chlordane. On-line. Integrated Risk Information System (IRIS). Cincinnati, OH: Office of Research and Development, Environmental Criteria and Assessment Office.

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