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: p,p'-DDD **CAS REGISTRY NUMBER:** 72-54-8

AMBIENT WATER QUALITY VALUE: 0.3 ug/L

BASIS: Oncogenic

I INTRODUCTION

This 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 0.01 ug/L for the sum of p,p'-DDT, p,p'-DDD and p,p'-DDE (NYS, 1984). Available information on p,p'-DDD was examined as described in "Scope of Review," below. Potential water quality values are derived below, and the value of 0.3 ug/L selected as described under "Selection of Value."

II PRINCIPAL ORGANIC CONTAMINANT CLASSES AND SPECIFIC MCL (702.3)

A. Discussion

p,p'-DDD does not have a Specific MCL as defined in 700.1. However, it is in principal organic contaminant class iii as defined in 700.1.

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

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 p,p'-DDD in drinking water.

B. Derivation of Water Quality Value

Because p,p'-DDD is in a principal organic contaminant class and has no Specific MCL, regulations require that the water quality value not exceed 5 ug/L.

III ONCOGENIC EFFECTS (702.4)

A. Data

U.S. EPA (1994) classifies p,p'-DDD as B2; a probable human carcinogen, on the basis of an increased incidence of lung tumors in male and female mice, liver tumors in male mice and thyroid tumors in male rats. Also, that it is both a metabolite of and structurally similar to the probable human carcinogen DDT. p,p'-DDD is an oncogen as defined in 6 NYCRR 700.1.

As shown in Exhibit 1, U.S. EPA (1994) derives an oral slope factor (cancer potency factor) for p,p'-DDD of 0.24 $(mg/kg/day)^{-1}$.

B. Derivation of Water Quality Value

The above 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 0.125 $(mg/kg/day)^{-1}$.

From this, a potential ambient water quality value of 0.3 ug/L is calculated as shown below. For a lifetime cancer risk level of 1×10^{-6}, a human dose is calculated:

$$\text{Human dose} = \frac{\text{risk level}}{\text{slope factor}}$$

$$= \frac{1 \times 10^{-6} \times 1000 \text{ ug/mg}}{0.125 \text{ (mg/kg/day)}^{-1}} = 8.00 \times 10^{-3} \text{ ug/kg/day}$$

Assuming a human body weight of 70 kg and a water consumption of 2 L/day, a potential ambient water quality value is calculated:

$$\text{Ambient Water Quality Value} = \frac{\text{human dose} \times 70 \text{ kg}}{} =$$

2 L/day

$$= \frac{8.00 \times 10^{-3} \text{ ug/kg/day} \times 70 \text{ kg}}{2 \text{ L/day}} =$$

= 0.280 ug/L, rounded to 0.3 ug/L

C. Discussion

The current fact sheet presents a separate value for p,p'-DDD alone, consistent with U.S. EPA's approach both on IRIS (U.S. EPA, 1994) and in their National Toxics Rule (U.S. EPA, 1992).

U.S. EPA (1988) also derived a human slope of 1.3 $(mg/kg/day)^{-1}$ for the same Tomatis data used in this fact sheet. As little methodological information is provided and the result is not consistent with either the previous fact sheet or EPA's IRIS value, this slope is not used in this fact sheet.

IV NON-ONCOGENIC EFFECTS (702.5)

No information was found for p,p'-DDD that would yield a value more stringent than the value derived for oncogenic effects.

V CHEMICAL CORRELATION (702.7)

A value based on chemical correlation was not derived because it is believed appropriate to derive a value based on existing data for oncogenic effects.

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 0.3 ug/L (6 NYCRR 702.4) is the most stringent value derived by these procedures and is the ambient water quality value for p,p'-DDD.

VII REFERENCES

Gingell, R. and L. Wallcave. 1976. Metabolism of 14C-DDT in the mouse and hamster. Xenobiotica. 6:15. [As cited by U.S. EPA, 1994]

Morgan, D.P. and C.C. Roan. 1977. The metabolism of DDT in man. Essays Toxicol. 5:39. [As cited by U.S. EPA, 1994]

NCI (National Cancer Institute). 1978. Bioassays of DDT, TDE and p,p'-DDE for possible carcinogenicity (CAS No. 50-29-3, 72-54-8, 72-55-9). NCI Report No. 131. DHEW Publ. No. (NIH) 78-1386. [As cited by U.S. EPA, 1994]

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.

NYS (New York State). 1984. Ambient Surface Water Quality Standards Documentation. DDT; DDD; DDE. Albany, NY: Department of Health.

Peterson, J.R. and W.H. Robinson. 1964. Metabolic products of p,p'-DDT in the rat. Toxicol. Appl. Pharmacol. 6:321. [As cited by U.S. EPA, 1994]

Tomatis, L., V. Turusov, R.T. Charles and M. Boicchi. 1974. Effect of long-term exposure to 1,1-dichloro-2,2-bis(p-chlorophenyl)ethylene, to 1,1-dichloro-2,2-bis(p-chlorophenyl)ethane, and to the two chemicals combined on CF-1 mice. J. Natl. Cancer Inst. 52(3):883-891.

U.S. EPA (Environmental Protection Agency). 1988. Evaluation of the Potential Carcinogenicity of DDD (72-54-8). Washington, D.C.: Office of Health and Environmental Assessment, Carcinogen Assessment Group. EPA/600/8-91/099. PB93-185205.

U.S. EPA (Environmental Protection Agency). 1992. Water Quality Standards; Establishment of Numeric Criteria for Priority Toxic Pollutants; States Compliance. Fed. Register 57(246): 60848-60923. December 22, 1992.

U.S. EPA (Environmental Protection Agency). 1994. p,p'-Dichlorodiphenyl dichloroethane (DDD). On-line. Integrated Risk Information System (IRIS).

Cincinnati, OH: Office of Research and Development, Environmental Criteria and Assessment Office.

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 p,p'-DDD; where none was found it is so noted.

- IRIS (U.S. EPA's Integrated Risk Information System). On-line database.
- RTECS (Registry of Toxic Effects of Chemical Substances). On-line database.
- CCRIS (Chemical Carcinogenesis Research Information System). On-line database.
- ATSDR (Agency for Toxic Substances and Disease Registry) toxicological profile.
- 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).
- IARC (International Agency for Research on Cancer) Monographs Supplement 7 (substance not listed).

Sources reviewed by NYS (1984) include:

- IARC (International Agency for Research on Cancer). 1974. IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Humans. 5: 83-124.
- National Academy of Sciences. 1977. Drinking Water and Health, Vol. 1. National Academy of Sciences. Washington, D.C.
- U.S. Environmental Protection Agency. 1980. Ambient water quality criteria for DDT. NTIS No. PB81-117491.

The sources above were deemed adequate to assess the literature through 1990. Coverage of recent literature was provided by a New York State Library on-line search of the databases listed below.

- NTIS (National Technical Information Service)
- TOXLINE
- BIOSIS

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Division of Water
SJS
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