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: 4-Chlorotoluene **CAS REGISTRY NUMBER:** 106-43-4

AMBIENT WATER QUALITY VALUE: 5 ug/L

BASIS: Surface Water: Principal Organic Contaminant Classes

Groundwater: Former Reference to 10 NYCRR Subpart 5-1 Principal Organic Contaminant (POC) General Maximum Contaminant Level (MCL)

SUMMARY OF INFORMATION

Introduction

A search of relevant sources (see Scope of Review, below) found few studies on the toxicity of 4-chlorotoluene (p-chlorotoluene). 4-Chlorotoluene is not listed on U.S. EPA's IRIS. U.S. EPA's Lifetime Health Advisory (HA) for this substance is derived from data on 2-chlorotoluene (o-chlorotoluene), because of insufficient data on 4-chlorotoluene and the lack of evidence that the metabolism and/or toxicity of the two isomers differ significantly (U.S. EPA, 1989a).

4-Chlorotoluene does not have a Specific MCL as defined in 6 NYCRR 700.1, but is in principal organic contaminant class iii as defined in 700.1.

Pharmacokinetics

The limited pharmacokinetic information found indicates that 4-chlorotoluene is absorbed from the gastrointestinal tract (U.S. EPA, 1989a). Following administration to rabbits (route not reported), 4-chlorotoluene was excreted in the urine as p-chlorobenzoic acid (Bray et al., 1955).

Oncogenic Effects

U.S. EPA (1989a) classifies 4-chlorotoluene in carcinogenicity Group D: not classified, a category for substances with inadequate evidence or no data. No other information on its oncogenicity was found.

Non-oncogenic Effects

Pis'ko et al. (1981) treated rats intragastrically with daily doses of 0.01, 0.1 and 1.0 mg/kg 4-chlorotoluene in a six-month study. Dose-related effects on hemopoiesis, neutrophil phagocytic activity, adrenal ascorbic acid content and liver enzymes were noted at the two higher doses. These investigators also noted a significant increase in total embryonic mortality from a dose of 55 mg/kg given daily for 2 months. They also looked for developmental effects in several studies; the only effect reported was a tendency toward formation of single chromosome fragments at a single dose of 1,833 mg/kg.

The abstract of another Russian study reported the maximum no effect dose of 4-chlorotoluene to be 0.01 mg/kg, and that this isomer had similar toxic manifestations as 2-chlorotoluene (Tolstopyatova and Zholdakova, 1980). According to U.S. EPA (1985), the abstract contained no further details.

In a 90-day study performed by Industrial Bio-test Laboratories, and submitted to U.S. EPA by Occidental Chemical (1987) a mixture of 51% 2-chlorotoluene and 48% 4-chlorotoluene was given orally by capsule to beagle dogs at 0, 30, 100 or 300 mg/kg/day. Effects reported at the high dose include a "slightly lower" (than control males) group mean overall body weight gain in males and "slightly lower...than control males" erythrocyte counts, hemoglobin concentrations and hematocrit values.

Terrill et al. (1990) administered 4-chlorotoluene (0, 50, 200 or 800 mg/kg/day) to 10 male and 10 female rats in a 90-day gavage study. Numerous effects were noted at the high dose, including the death of 4/10 males and 2/10 females, which were considered treatment-related. Other effects in one or both of the high groups included significantly increased blood urea nitrogen, creatinine, alkaline phosphatase and total bilirubin values, and significantly decreased sodium. Compound-related effects to the liver, kidney and adrenal gland of high-dose animals were identified via histopathological examination. Terrill et al. concluded that 200 mg/kg/day represented a no-observable-effect level (NOEL), despite a couple of statistically significant findings at this and the low dose.

As described below, U.S. EPA's Lifetime Health Advisory for 4-chlorotoluene is based on that for 2-chlorotoluene. The value for 2-chlorotoluene is derived from a no-observed-adverse-effects level (NOAEL) of 20 mg/kg/day from a subchronic oral study in rats by Gibson et al. (1974a). In this study, rats administered 2-chlorotoluene via gavage for 103 to 104 days at 0, 20, 80 or 320 mg/kg/day exhibited effects at the middle dose including increased blood urea nitrogen and adrenal weight, and decreased mean body weight gain.

OTHER VALUES

The U.S. EPA (1989a) uses the Lifetime Health Advisory (HA) of 100 ug/L derived for 2-chlorotoluene as the Lifetime HA for 4-chlorotoluene as well, given both the lack of sufficient data on 4-chlorotoluene and of evidence that the metabolism and/or toxicity of the two isomers differ significantly.

There is no federal maximum contaminant level goal (MCLG) or MCL for 4-chlorotoluene in drinking water. Under the State Sanitary Code, (10 NYCRR Part 5, Public Water Supplies), the New York State Department of Health has established a maximum contaminant level of 5 ug/L for "principal organic contaminants" such as 4-chlorotoluene in drinking water.

DERIVATION OF VALUE

U.S. EPA (1989a) did not derive a Lifetime HA for 4-chlorotoluene from compound-specific data. They did not use the Pis'ko et al. (1981) data "due to the questionable significance of the reported observations," a decision with which New York State concurs. Neither Gibson et al. (1974a) nor any of the other studies described above would yield a value more stringent than the principal organic contaminant value of 5 ug/L. The above information on the Tolstopyatova and Zholdakova (1980) study was insufficient to derive a value. Specific derivations for surface water and groundwater are described separately below because of a historical difference between them in State water quality regulations.

Surface Water

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 principal organic contaminant class value of 5 ug/L (702.3(b)) represents the most stringent value that can be derived for 4-chlorotoluene. Therefore, the ambient surface water quality value for 4-chlorotoluene is 5 ug/L.

Groundwater

The principal organic contaminant (POC) groundwater standard of 5 ug/L (6 NYCRR 703.5) applies to 4-chlorotoluene. This standard became effective on January 9, 1989 by inclusion by reference to 10 NYCRR Subpart 5-1 standards. The basis and derivation of the POC standard are described in a separate fact sheet.

REFERENCES

Bray, H.G., B.G. Humphris, W.V. Thorpe, K. White and P.B. Wood. 1955. Kinetic studies on the metabolism of foreign organic compounds. Biochem J. 59:162-167. (As cited by U.S. EPA, 1989a).

Gibson, W.R., F.O. Gossett, G.R. Koenig and F. Marroquin. 1974a. The toxicity of daily oral doses of o-chlorotoluene in the rat. Prepared by Toxicology Division, Lilly Research Laboratories. Submitted to Test Rules Development Branch, Office of Toxic Substances, U.S. EPA, Washington, D.C. (As cited by U.S. EPA, 1989a and 1989b).

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 Water Supply Protection.

Occidental Chemical. 1987. 90-Day subacute oral toxicity study with monochlorotoluene isomers (lot no. S-75-1300) in beagle dogs with cover letter dated 062587. TSCA 8(d) submission to U.S. EPA Office of Toxic Substances. NTIS/OTS #0513167.

Pis'ko, G.T., T.V. Tolstopyatova, T.V. Belyanina et al. 1981. Study of maximum permissible concentrations of o- and p-chlorotoluenes in bodies of water. Gig. Sanit. (8):67-68 (Rus. translation). (As cited by U.S. EPA, 1989a).

Terrill, J.B., M. Robinson, G.W. Wolfe and L.H. Billups. 1990. Subacute and subchronic oral toxicity of p-chlorotoluene in the rat. Journal of the American College of Toxicology 9(5):487-495. Reprinted as EPA/600/J-90/537; PB 91-233379.

Tolstopyatova, G.V. and Z.I. Zholdakova. 1980. Comparative hygienic characteristics of chloro derivatives of toluene as possible water pollutants. Gig. Sanit. (12):64-66. (Rus) [CA 94(17)133360e]. (As cited by U.S. EPA, 1985).

U.S. EPA (Environmental Protection Agency). 1985. Health and Environmental Effects Profile for Chlorotoluenes. Cincinnati, OH: Environmental Criteria and Assessment Office. EPA/600/X-85/045. PB88-176052.

U. S. EPA (Environmental Protection Agency). 1989a. Health Advisory for p-Chloro-toluene. Washington, D.C.: Office of Science and Technology, Office of Water.

U. S. EPA (Environmental Protection Agency). 1989b. Health Advisory for o-Chloro-toluene. Washington, D.C.: Office of Science and Technology, Office of Water.

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 4-chlorotoluene; where no information was found it is so noted.

- IRIS (U.S. EPA's Integrated Risk Information System). On-line database (substance not on IRIS).
- RTECS (Registry of Toxic Effects of Chemical Substances). On-line database.
- 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).
- U.S. EPA ambient water quality criteria document (document not found).
- U.S. EPA health advisory.
- U.S. EPA drinking water criteria document (document not found).
- IARC (International Agency for Research on Cancer) Monographs Supplement 7 (substance not listed).

The sources above are deemed adequate to assess the literature through 1983. Coverage of recent literature (through 1993) was provided by a New York State Library on-line search of the databases listed below.

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

New York State Department of Environmental Conservation
Division of Water
SJS
December, 1994