Fact Sheet Date: September 24, 1998

NEW YORK STATE
- HUMAN HEALTH FACT SHEET -

Ambient Water Quality Value for Protection of Sources of Potable Water

SUBSTANCE: Thallium **CAS REGISTRY NUMBER:** Not applicable

AMBIENT WATER QUALITY VALUE: 0.5 micrograms/liter (0.5 ug/L)

BASIS: Non-Oncogenic Effects (6 NYCRR 702.5)

INTRODUCTION

The physical, chemical, and toxicological properties of thallium have been reviewed (ATSDR, 1992; Kazantzis, 1986; Manzo and Sabbioni, 1988; US EPA, 1990, 1992a,b). 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)

Thallium does not have a Specific MCL (maximum contaminant level) as defined in 6 NYCRR 700.1(a)(41) and is not in a principal organic contaminant class as defined in 6 NYCRR 700.1(a)(34). Therefore, a water quality value cannot be derived under 6 NYCRR 702.3.

ONCOGENIC EFFECTS (702.4)

Data on the oncogenicity of thallium were not found.

NON-ONCOGENIC EFFECTS (702.5)

Thallium causes hair loss, nerve, kidney and testes damage in laboratory animals and learning defects in animals exposed prenatally (ATSDR, 1992; Kazantzis, 1986; Manzo and Sabbioni, 1988; US EPA, 1992a,b). In 1988, the U.S. EPA established an oral reference dose (equivalent to an acceptable daily intake) of 0.08 micrograms per kilogram body weight per day (0.08 ug/kg/day) for thallium sulfate (Exhibit 1, taken from US EPA, 1995), using procedures consistent with those outlined in paragraphs (a) and (b) of 6 NYCRR 702.5. This equals a reference dose of 0.07 ug/kg/day for thallium itself, given that approximately 80% of the molecular weight of thallium sulfate is thallium. These reference doses were derived by application of a 3,000-fold uncertainty factor to no-observed-effect levels of 250 ug/kg/day for thallium sulfate and 200 ug/kg/day for thallium for gross or histopathological changes in rats exposed, by gavage, to thallium sulfate for 90 days (Stoltz et al., 1986). An uncertainty factor of 3,000 was used to account for human variability, differences between animals and humans, use of a subchronic study to derive the reference dose, and the lack of reproductive and chronic toxicity data. A larger than usual uncertainty factor is warranted given the potential for thallium to be a developmental/reproductive toxicant and the limited data base on chronic toxicity. A value of 0.5 ug/L of thallium 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)

Although available data were not sufficient to evaluate thallium based on oncogenic effects (702.4) and aesthetic considerations (702.6), values based on chemical correlation were not derived because of insufficient data.

OTHER STANDARDS AND GUIDELINES

Under the Safe Drinking Water Act, the federal maximum contaminant level goal (MCLG) for thallium is 0.5 ug/L, assuming a 70-kg adult drinks 2 L/day and allocating 20% of the U.S. EPA reference dose (0.07 ug/kg/day) to drinking water (US EPA, 1992b). The federal MCL is 2 ug/L, based on analytical considerations (US EPA, 1992b).

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 0.5 ug/L (based on non-oncogenic effects) and is the value selected as the water quality value for thallium.

REFERENCES

ATSDR (Agency for Toxic Substances and Disease Registry). 1992. Toxicological Profile for Thallium. Atlanta, GA: U.S. Department of Health and Human Services, U.S. Public Health Service.

Kazantzis, G. 1986. Thallium. In: Handbook on the Toxicology of Metals, 2nd Edit., Vol. 2. Friberg, L., G.F. Nordberg, and V.B. Vouk, eds. Amsterdam, Netherlands: Elsevier. Pp. 549-567.

Manzo, L. and E. Sabbioni. 1988. Thallium toxicity and the nervous system. In: Metal Toxicity. Bondy, S.C. and K.N. Prasad, eds. Boca Raton, FL: CRC Press. pp. 35-54.

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.

Stoltz, M.L., M.A. Stedham, L.K. Brown, and others. 1986. Subchronic (90-day) Toxicity of Thallium (I) Sulfate (CAS No. 7446-18-6) in Sprague-Dawley Rats. Kansas City, MO: Midwest Research Institute.

US EPA (U.S. Environmental Protection Agency). 1990. National Primary Drinking Water Regulation; Synthetic Organic Chemicals and Inorganic Chemicals; Proposed Rule. Fed. Register. 55:30370-30448.

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US EPA (U.S. Environmental Protection Agency). 1995. Thallium Compounds. On-Line as of May 1. Integrated Risk Information System (IRIS). Cincinnati, OH: Office of Research and Development, Environmental Criteria and Assessment Office.

SEARCH STRATEGY: ON-LINE TOXICOLOGIC DATABASE

Toxline (1981 to May, 1995) was searched linking thallium with the keyword "toxicity."

Bureau of Toxic Substance Assessment/htn02&kmm12
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[Revised 9/24/98 by DOW (SJS) solely to delete Aesthetic Considerations]