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: N-Methylaniline **CAS REGISTRY NUMBER:** 100-61-8

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)

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. Available information on N-methylaniline (NMA) was examined as described in "Scope of Review," below. Potential water quality values are derived below, and the value of 5 ug/L selected as described under "Selection of Value."

II PRINCIPAL ORGANIC CONTAMINANT CLASSES AND SPECIFIC MCL (702.3)

A. Discussion

N-Methylaniline does not have a Specific MCL as defined in 700.1. N-Methylaniline is in a principal organic contaminant class (class iv) as defined in 700.1.

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

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 N-Methylaniline in drinking water.

B. Derivation of Water Quality Value

Because N-methylaniline 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)

A. Data

Insufficient data exist upon which to determine the oncogenic potential of N-methylaniline or to derive a value based on oncogenic effects.

IV NON-ONCOGENIC EFFECTS (702.5)

Insufficient data exist upon which to determine the oncogenic potential of N-methylaniline or to derive a value based on non-oncogenic effects.

V CHEMICAL CORRELATION (702.7)

N-Methylaniline (NMA) is structurally and toxicologically similar to aniline. The metabolic pathways for both of these compounds proceed via very similar mechanisms of carbon and/or nitrogen oxidation. Aniline is metabolized by liver microsomes to various amino phenols via c-hydroxylation and to nitrosobenzene and methemoglobin by reaction with hemoglobin (Kiese, 1966). NMA is an intermediate in metabolism of aniline. NMA and aniline both cause methemoglobinemia (Kiese, 1974; Lin, 1972). The results of hemoglobin binding studies with aniline and NMA supported the idea that the nitrosoarenes, as metabolites of arylamines, with hemoglobin, represent a general pathway in vivo (Birner and Neumann, 1988). Phenyl hydroxylamine and nitrosobenzene have been considered to be the active metabolites of aniline and NMA in producing methemoglobin in vivo (Kiese, 1965). These facts support setting a value for N-methylaniline on the basis of chemical correlation.

An oncogenic-based value of 10 ug/L was derived for aniline (NYS, 1997). On the basis of chemical correlation, Section 702.7, a value of 10 ug/L could be derived for N-methylaniline.

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 principal organic contaminant class value of 5 ug/L (6 NYCRR 702.3(b)) is the most stringent value derived by these procedures and is the ambient water quality value for N-methylaniline.

It should be noted that the principal organic contaminant (POC) value of 5 ug/L became a standard for groundwater (6 NYCRR 703.5) effective on January 9, 1989 by reference to 10 NYCRR Subpart 5-1 standards. The basis and derivation of this POC standard are described in a separate fact sheet.

VII REFERENCES

Birner, G. and H.G. Neumann. 1988. Biomonitoring of aromatic amines II. Hemoglobin binding of some monocyclic amines. Arch. Toxicol. 62:110-115.

Kiese, M. 1965. Relationship of drug metabolism to methemoglobin formation. Ann N.Y. Acad. Sci. 123:141.

Kiese, M. 1966. The biochemical production of ferrihemoglobin-forming derivatives for aromatic amines. Pharm. Rev. 18:1091-1161.

Kiese, M. 1974. Methemoglobinemia: A comprehensive treatise. Cleveland, OH: CRC Press.

Le, J., K. Jung and M. Kramer. 1985. Effects of using liver fractions from different mammals on results of mutagenicity assays in S. typhimurium. Fd. Chem. Toxicol. 23:695-700.

Lin, J. 1972. Methemoglobin induced by carcinogenic aminoazo dyes in rats. Biochem. Pharmacol. 21:2147-50.

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.

New York State. 1985. Aniline. Ambient Surface Water Quality Standards Documentation. Albany, N.Y.

New York State. 1997. New York State Human Health Fact Sheet. Ambient Water Quality Value for Protection of Sources of Potable Water. Aniline. Albany, New York: NYS Department of Environmental Conservation.

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 their information on N-methylaniline; where none was found it is so noted.

- IRIS (U.S. EPA's Integrated Risk Information System) (on-line) not on IRIS.
- RTECS (Registry of Toxic Effects of Chemical Substances) (on-line).
- CCRIS (Chemical Carcinogenesis Research Information System) (on-line).
- ATSDR (Agency for Toxic Substances and Disease Registry) toxicological profile (not found).
- U.S. EPA ambient water quality criteria document (not found).
- U.S. EPA health advisory (not found).
- U.S. EPA drinking water criteria document (not found).
- U.S. EPA Drinking Water Regulations and Health Advisories, Office of Water, May 1994 (not found).
- IARC (International Agency for Research on Cancer) Monographs Supplement 7 (not found).

No comprehensive review document was found for N-methylaniline. Therefore, an on-line search of the literature was conducted by the New York State Library from 1993 back to the 1960's on the databases listed below.

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

New York State Department of Environmental Conservation
Division of Water
AS
November, 1995