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: Chlorobenzene **CAS REGISTRY NUMBER:** 108-90-7

AMBIENT WATER QUALITY VALUE: 5 micrograms/liter (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)

INTRODUCTION

The physical, chemical, and toxicological properties of chlorobenzene have been reviewed (ATSDR, 1990; NIOSH, 1993; US EPA, 1980, 1985a,c, 1986, 1987, 1989). 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)

Chlorobenzene does not have a Specific MCL (maximum contaminant level) as defined in 6 NYCRR 700.1 and is in principal organic contaminant class iii as defined in 6 NYCRR 700.1. Therefore, a water quality value of 5 ug/L can be derived based on 6 NYCRR 702.3(b).

ONCOGENIC EFFECTS (702.4)

Chlorobenzene increased the incidence of neoplastic nodules in the liver of male rats. Under current terminology (US EPA, 1985b), such lesions would be classified as either preneoplastic lesions (hyperplasia) or benign tumors (hepatocellular adenomas). Chlorobenzene did not induce liver carcinomas in male rats and did not increase tumor

incidences in female rats or male or female mice (NTP, 1985). Based on the above, the National Toxicology Program (NTP, 1985) concluded that there was some, but not clear, evidence of carcinogenicity of chlorobenzene in male rats. Chlorobenzene was inactive in most short-term tests indicative of potential oncogenic activity. The available data are inadequate to evaluate the oncogenic potential of chlorobenzene (US EPA, 1991, 1994).

NON-ONCOGENIC EFFECTS (702.5)

Chlorobenzene causes liver, blood, and kidney damage in laboratory animals (ATSDR, 1990; NTP, 1985; US EPA, 1986, 1987). There are gaps in the toxicological data on the non-oncogenic effects of chlorobenzene (US EPA, 1995). In 1989, the U.S. EPA (using the available data) established an oral reference dose (equivalent to an acceptable daily intake) for chlorobenzene of 20 micrograms per kilogram per day (20 ug/kg/day, rounded from the calculated value of 19 ug/kg/day) (Exhibit 1, taken from US EPA, 1995), using procedures consistent with those outlined in paragraphs (a) and (b) of 6 NYCRR 702.5. This reference dose was derived by application of a 1,000-fold uncertainty factor to a no-observed-effect level of 19 milligrams per kilogram per day (19 mg/kg/day) for histopathologic changes in the liver of dogs given capsules containing chlorobenzene for 13 weeks (US EPA, 1995). The uncertainty factor of 1,000 was used to account for variability among humans, differences between animals and humans and the use of a subchronic study to derive the reference dose. A value of 140 ug/L 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 chlorobenzene based on oncogenic effects (6 NYCRR 702.4), a value based on chemical correlation was not derived because of insufficient data on substances similar in structure to chlorobenzene (i.e., fluorobenzene and bromobenzene).

OTHER STANDARDS AND GUIDELINES

Under New York State Department of Health regulations for drinking-water standards (10 NYCRR Part 5), chlorobenzene is a principal organic contaminant (POC) and has a MCL of 5 ug/L. Under the Safe Drinking Water Act, the federal maximum contaminant goal (MCLG) and the MCL for chlorobenzene are both 100 ug/L (rounded from the calculated value of 140 ug/L), assuming a 70-kg adult drinks 2 L/day and allocating 20% of the U.S. EPA reference dose (20 ug/kg/day) to drinking water (US EPA, 1991).

The World Health Organization (WHO) calculated a tolerable daily intake of 85.7 ug/kg/day for chlorobenzene by applying an uncertainty factor of 500 to a no-observed-effect level of 60 mg/kg/day for neoplastic nodules identified in a two-year rat study with dosing by gavage, five days per week (WHO, 1993). An uncertainty factor of 500 was used to account for human variability, differences between animals and humans, and the limited

evidence of carcinogenicity. The WHO also derived a guideline value of 300 ug/L for chlorobenzene in drinking water (rounded from the calculated value of 257 ug/L), assuming a 60-kg adult drinks 2 L/day and allocating 10% of the WHO tolerable daily intake (85.7 ug/kg/day) to drinking water (WHO, 1993).

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. The POC class value of 5 ug/L (6 NYCRR 702.3(b)) represents the most stringent value and is the value selected as the water quality value for chlorobenzene.

It should be noted that the 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.

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SEARCH STRATEGY: ON-LINE TOXICOLOGIC DATABASE

Toxline (1981 to May, 1995) was searched linking the CAS Registry Number of chlorobenzene with the keyword "toxicity."

Bureau of Toxic Substance Assessment/htn02&kmm12
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