SECTION II

PUBLIC WATER SUPPLIES

NITRILOTRIACETATE (NTA)

Because of its possible large-scale use, nitrilotriacetate (NTA) should be evaluated in light of chronic low-level exposure via drinking water and its potential for adversely affecting the health of the general population. Although nitrilotriacetic acid, a white crystalline powder, is insoluble in water, the tribasic salts are quite soluble.

NTA has strong affinity for iron, calcium, magnesium, and zinc (Bailar 1956). Its relative affinity for toxic metals such as cadmium and mercury is not presently known, nor have its chelating properties in complex ionic solutions been characterized. Copper and lead concentrations in biologically treated waste water after flocculation with aluminum sulfate (125 mg/l) are a function of the NTA present (Nilsson 1971). No information is available on the toxicity of such chelates. No cases of acute human poisoning by NTA have been reported.

In the natural environment, NTA is biodegraded to CO_2, NO_3, and H_2O, with glycine and ammonia as intermediates (Thompson and Duthie 1968). This appears to occur within four to five days. Degradation is accelerated by biological waste treatment. Conversion of NTA to nitrate is on a 1 to 1 molar basis.

Recommendation---

No recommendation concerning NTA is made at this time because of the absence of data on affinity for toxic metals, the absence of adequate toxicity data, and the absence of

demonstrable effects on man, and because there is doubt about its potential use as a substitute for phosphates in detergents. Toxicity information should be developed and evaluated to establish a reasonable recommendation prior to a substitution.

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PWS

PHTHALATE ESTERS

Large quantities of phthalate esters are used as plasticizers in plastics. Phthalates in water, fish, and other organisms, represent a potential but largely unknown health problem. They have been implicated in growth retardation, accumulation, and chronic toxicity, but little conclusive information is available (Phthalates are discussed in [illegible] Section III, Freshwater Aquatic Life and Wildlife.) Because there is insufficient information on their specific effects on man, no scientifically defensible recommendation can be made at this time concerning concentrations of phthalate esters in public water supply sources.

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POLYCHLORINATED BIPHENYLS (PCB)

Polychlorinated biphenyls (PCB) consist of a mixture of compounds only slightly soluble in water; highly soluble in fats, oils, and nonpolar liquids; and highly resistant to both heat and biological degradation. PCB have a wide variety of industrial uses, primarily as insulating fluid in electrical and heat transfer equipment (Interdepartmental Task Force 1972).

Exposure to PCB is known to cause skin lesions (Schwartz and Peck (1943) and to increase liver enzyme activity that may have a secondary effect on reproductive processes (Risebrough et al. 1968, Street et al. 1969, Wassermann et al. 1970). It is not clear at this time whether the effects are due to PCB or its contaminants, the chlorinated dibenzofurans that are highly toxic (Bauer et al. 1961, Schulz 1968, Verrett 1970). It is also not known whether the chlorinated dibenzofurans are produced by degradation of PCB as well as during its manufacture.

The occurrence of PCB in our waters has been documented repeatedly (New Scientist 1966, Holmes et al. 1967, Risebrough et al. 1968, Jensen et al. 1969, Koeman et al. 1969, Schmidt et al. 1971, Veith and Lee 1971). They have been associated with sewage effluents (Holden 1970, Schmidt et al. 1971) and rainwater (Tarrant and Tatton 1968), as well as releases and leakage. Failures of closed systems using PCB have caused some of the more well known releases (Kuratsune et al. 1969, Duke et al. 1970). It has been reported that the defined treatment process does little or nothing to remove PCB (Ahling and Jensen 1970).

An epidemiological study on severe poisoning by rice oil contaminated with polychlorinated biphenyls in 1968 indicated that about 0.5 grams ingested over a period of approximately one month was sufficient to cause the Yusho disease. Many of those affected showed no signs of relief after about three years (Kuratsume et al. 1969). Price and Welch (1971) have estimated on the basis of 194 samples that 41-45 per cent of the general population of the U.S. may have PCB levels of 1.0 mg/kg or higher (wet weight) in adipose tissue. Therefore, it appears that PCB may accumulate in the body. On this basis it can be calculated that a daily intake of 0.02 mg would require about 70 years to be toxic. Applying a factor of safety of 10 would permit a daily intake of 0.002 mg, and assuming a two liter per day intake, suggests a permissible concentration in water to be 0.001 mg/l.

However, evaluation of the retention and accumulation of PCB from water instead of oil in humans is highly desirable. A study on rats with a single oral dose of 170 mg/kg showed urinary excretion (of PCB) to be limited, while 70 per cent of the dose was found in the feces during an eight week period (Yoshimura et al. 1971). Information on PCB in the diet would also be helpful.

Recommendation

Because too little is known about the levels in waters, the retention and accumulation in humans, and the effects of very low rates of ingestion, no defensible recommendation can be made at this time.