VALUE(S) ADDED 7-24-85

FACT SHEET REVISED _____

VALUE(S) REMOVED _____

AMBIENT SURFACE WATER QUALITY STANDARDS DOCUMENTATION

CHEMICAL: Carbofuran

CAS NO.(s): 1563-66-2

BASIS (Human/Aquatic): Human

WATER CLASSIFICATION: AA; AA-s; A; A-s

STANDARD: 15 ug/l Note B

REMARKS:

SUMMARY INFORMATION:

Available toxicity information on carbofuran has been reviewed.[1-5] It is a carbamate insecticide, acaricide, and nematocide capable of interfering with nerve transmission by inhibition of the enzyme acetylcholinesterase. Most of the toxicological data consists of unpublished manufacturer-sponsored studies; a no observed effect level in the rat of 20 ppm in the diet was determined by a two year toxicity and carcinogenicity study and a three generation reproduction study. The 20 ppm dietary level corresponds to a daily intake of about 1 mg carbofuran/kg body weight. Using a 100 fold uncertainty factor and allowing 20% of the daily intake to come from water, a guideline of 70 ug/l can be calculated. However, the differences in cholinesterase inhibition between neonates, weanlings and adult rats were also studied; the results suggested that the neonate, and possibly the weanling, are more sensitive and take longer to recover from the administration of carbofuran, and that brain cholinesterase is more sensitive than plasma or red blood cell cholinesterase.

A human cholinesterase study was conducted on nine adult males. Although the data are limited, a no observed effect level of 0.05 mg/kg can be estimated for inhibition of red blood cell cholinesterase by carbofuran. Using a 10 fold uncertainty factor and allowing 20% of the daily intake to come from water, a guideline of 35 ug/l can be calculated to protect against inhibition of red blood cell cholinesterase in adults. Brain cell cholinesterase is, however, more sensitive to cholinesterase inhibition than plasma or red blood cell cholinesterase (based on limited animal data), but cannot be measured in humans. If brain cholinesterase is estimated to be twice as sensitive, the calculated guideline would become 17 ug/l. A level of 15 ug/l could also be calculated based on a 2.3 kilogram neonate consuming 0.7 liters of water per day, assuming 100% of the daily intake came from water (infant diet). Based on the above estimates, the New York State Department of Health established (1980) a guideline of 15 ug/l for carbofuran in drinking water.

Water supplies (groundwater, to date) verified by the Department as having carbofuran in excess of this level have been restricted and alternative sources of drinking water or treatment used in the communities involved. The drinking water guideline is being re-evaluated in light of additional toxicity studies on this compound.

STANDARD DERIVATION:

Based on the calculations summarized above, the drinking water guideline of 15 ug/l is recommended as the ambient water quality standard for carbofuran. The standard may be modified following review and evaluation of recently submitted toxicity studies on this compound.

REFERENCES:

(1) National Academy of Sciences. 1983. Drinking Water and Health, Vol. 5. National Academy Press, Washington, D.C.

(2) World Health Organization. 1983. Pesticide Residues in Food - 1982. Report of the joint meeting of the FAO panel of experts on pesticide residues in food and the environment and the WHO expert group on pesticide residues. Food and Agricultural Organization of the United Nations, Rome.

(3) World Health Organization. 1981. Pesticide Residues in Food - 1980. Report of the joint meeting of the FAO panel of experts on pesticide residues in food and the environment and the WHO expert group on pesticide residues. Food and Agricultural Organization of the United Nations, Rome.

(4) World Health Organization. 1980. Pesticide Residues in Food - 1979. Report of the joint meeting of the FAO panel of experts on pesticide residues in food and the environment and the WHO expert group on pesticide residues. Food and Agricultural Organization of the United Nations, Rome.

(5) World Health Organization. 1977. Pesticide Residues in Food - 1976. Report of the joint meeting of the FAO panel of experts on pesticide residues in food and the environment and the WHO expert group on pesticide residues. Food and Agricultural Organization of the United Nations, Rome.

TG/pb

DEC 2 8 1984