

AMBIENT SURFACE WATER QUALITY
STANDARDS DOCUMENTATION

CHEMICAL: Magnesium

CAS NO.(s): NA

BASIS (Human/Aquatic): Human

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

STANDARD: 35,000 ug/l Note B

REMARKS:

SUMMARY INFORMATION:

Magnesium is one of the most common elements in ores, minerals, rocks and soil and is also found abundantly in foods such as nuts, legumes and seafoods. Magnesium is an essential element in human nutrition; being necessary for the function of many enzyme systems and for the maintenance of neuromuscular function. Based on the results of balance studies, daily intakes from 3 to as high as 10 mg/kg body weight per day have been estimated to be adequate to maintain magnesium balance in the body. These estimates and usual dietary intakes were used to establish the recommended daily dietary allowance (RDA)¹ for magnesium ranging from 50 to 70 mg/day for infants, 150 to 250 mg/day for children, and 300 to 450 mg/day for adults. Most diets contain adequate amounts providing 240 to 480 mg magnesium per day. Typical levels in water supplies average about 6 mg/l with a maximum reported value of 120 mg/l; most contain less than 20 mg/l. Therefore, typical drinking water in the United States provides less than 10% of the RDA for magnesium intake by a healthy human. In areas where magnesium concentration is high, over 50% of the RDA could come from 2 liters of water.

Available toxicity information on magnesium has been reviewed.¹⁻⁴ In patients with renal disease and impaired magnesium excretion, large excesses of magnesium can lead to severe toxicity resulting in muscle weakness, hypotension, sedation, confusion, respiratory paralysis, coma and death. Magnesium salts at levels of about 250 mg/l may have a transient laxative effect in some individuals. In addition, sensitive individuals can taste magnesium in water at levels of about 80 mg/l or lower.

STANDARD DERIVATION

Based upon the results of balance studies and typical dietary intakes, the RDA for magnesium is equivalent to a daily dose of approximately 5 mg/kg body weight (for adults). This represents an estimate of an acceptable daily intake in that nutritional needs are met with no adverse effects. Consumption of 2 liters of water per

day containing 35 mg of magnesium/liter would provide a dose corresponding to approximately 20% of the estimated ADI and insure protection from laxative and aesthetic effects. A level of 35,000 ug/l is recommended as the ambient water quality standard for magnesium. Such a level, however, if found in a drinking water supply, would probably indicate unnatural contamination.

REFERENCES:

- (1) National Academy of Sciences. 1980. Recommended Dietary Allowances. Committee on Dietary Allowances of the National Research Council, National Academy of Sciences, Washington, D.C.
- (2) National Academy of Sciences. 1977. Drinking Water and Health. Vol. 1, National Academy Press, Washington, D.C.
- (3) National Academy of Sciences. 1980. Drinking Water and Health. Vol. 3, National Academy Press, Washington, D.C.
- (4) Massry, S., 1977, Pharmacology of magnesium. Ann. Rev. Pharmacol. Toxicol., 17, 67-82.

JS/pb

DEC 20 1984