UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

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July 17, 1989

OFFICE OF
THE ADMINISTRATOR

Honorable William K. Reilly
Administrator
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington, D.C. 20460

Subject: Science Advisory Board's review of the SULFATE health criteria document

Dear Mr. Reilly:

The Metals Subcommittee of the Science Advisory Board's Environmental Health Committee has completed its review of the Drinking Water Health Criteria Document for Sulfate dated August, 1987. The review was conducted December 8-9, 1988 at the One Washington Circle Hotel in Washington, D.C. Participants in the review are listed in Enclosure 1. The Subcommittee review focused on three major issues:

Should a lifetime Drinking Water Equivalent Level (DWEL) be set for sulfate?

Should an acute DWEL be set to protect children?

If an acute DWEL is set, what is an appropriate level?

The Office of Drinking Water proposed an acute DWEL of 200 mg/l based on the Saskatchewan data (Chien L., Robertson H., Gerrard JW., 1968) reporting diarrhea in infants ingesting formula prepared with water containing sulfates in concentrations from 630 to 1150 mg/l. The lower value of 630 mg/l was used, with an uncertainty factor of three (rather than the more typical value of ten, because of the low toxicity of sulfates and the apparent capability to acclimate to sulfates in drinking water in a few days), yielding the 200 mg/l value for sulfate.

After considerable discussion, the Subcommittee recommends that the sulfate document be referred for public comment. We cannot at this time, with the data presented, support the setting of an acute DWEL, and concur with the program's position that the data do not allow the setting of a lifetime DWEL.

The Subcommittee felt some sense of frustration with the data available to the Office of Drinking Water (ODW). The program staff seems to have done a thorough review of the literature--some 53 studies were cited. Of this entire body of data, however, only eight studies provided information useful in quantifying effects and attempting to calculate a DWEL (See Enclosure 2). Unfortunately, taken singly or in toto, this subset does not provide data adequate to determine either a chronic or acute DWEL.

Each study seemed to be lacking in some specific dimension, and could not be related coherently to other data. We believe that ODW should attempt to get more detailed information from authors of the National Academy of Science Safe Drinking Water Committee report (1977), and the Moore (Moore, EW. 1952.) and Peterson (Peterson NL., 1951) studies, to determine if they could be used to develop a better foundation for calculating a DWEL. It may also be useful to contact the Canadian authorities to get additional information on the health effects noted in the Saskatchewan data (cited above) used to formulate the proposed DWEL.

Finally, even taking into consideration the somewhat inchoate data, a majority of the Subcommittee believes that ODW has used too high an uncertainty factor in calculating the proposed DWEL. Since the mode of action for sulfate is fairly well known, and some human data are available, an uncertainty factor of 1.5 seems more appropriate than the proposed figure of 3.0.

Detailed comments on editorial and technical issues have been separately supplied to the program office. The Subcommittee stands ready to revisit this issue when additional data are available.

Enclosures

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## ABSTRACT

This report presents the conclusions and recommendations of the U.S. Environmental Protection Agency's Science Advisory Board summarizing a review of the Drinking Water Health Criteria Document for Sulfate. The Board's major conclusion is that the proposed acute Drinking Water Equivalent Level (DWEL) of 0.200 mg/l of sulfate, based on the 1968 Chien et al study, is not supportable because of inadequate data. The Board also recommended that the document be referred for public comment.



Key Words: Sulfate; DWEL; drinking water,

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ENCLOSURE 2

Chien L. Robertson H, Gerrard JW. 1968. Infantile gastroenteritis due to water with high sulfate content. Can. Med. Assoc. J. 99:102-104.

Cocchetto DM, Levy G. 1981. Absorption of orally administered sodium sulfate in humans. J Pharmacol. Sci. 70:331-333.

Digesti RD, Weeth HJ. 1976. A defensible maximum for inorganic sulfate in drinking water of cattle. J. Anim. Sci. 42:1498-1502.

Moore EW. 1952. Physiological effects of the consumption of saline drinking water. A progress report to the 16th Meeting of the Subcommittee on Water Supply of the Committee on Sanitary Engineering and Environment, January, 1952. Washington, DC: National Academy of Sciences, Appendix B. (Cited in Scofield and Hsieh, 1983.)

Morris ME, Levy G. 1983a. Serum concentration and renal excretion by normal adults of inorganic sulfate after acetaminophen, ascorbic acid, or sodium sulfate. Clin. Pharmacol. Ther. 33:529-536.

Morris ME, Levy G. 1983b. Absorption of sulfate from orally administered magnesium sulfate in man. J. Toxicol. 20:107-114.

Peterson NL. 1951. Sulfates in drinking water. Official Bulletin N.D. Water Sewage Works 18:11. (Cited in Scofield and Hsieh 1983)

Wurzner HP. 1979. Exposure of rats during 90 days to mineral water containing various amounts of sulphate. Z. Ernahrung. 18:119-127.