



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

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OFFICE OF  
THE ADMINISTRATOR

July 17, 1989

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 CYANIDE 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 Cyanide, dated September, 1988. 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 the enclosure.

The Subcommittee addressed one major issue pertaining to this document:

Should the Office of Drinking Water (ODW) base its Reference Dose (RfD) estimate on a study of HCN feeding over a two-year period (Howard and Hanzal, 1955), or a more recent effort (IITRI, 1986) using gavage with copper cyanide (CuCN) for 90 days?

The Subcommittee recommends that, although there are some gaps in the data, the ODW should use the Howard and Hanzal HCN data to calculate the RfD and the subsequent Drinking Water Equivalent Level (DWEL). Although the IITRI study used twice the number of rats per group, and explored more concentrations of cyanide, there are several reasons to reject the IITRI work as the basis of an RfD. First, administration was by gavage in a bolus, a means of administration less representative of Agency concerns than chronic exposure to cyanide in drinking water. Second, it was not a life time study, i.e., CN was administered over a 90-day period. Although 90-day studies suffice, in many instances for hazard identification, they pose interpretive problems for RfD calculation. Third, the compound administered was CuCN, a sparingly soluble compound in water. More importantly, the toxicity observed in the IITRI study might be intensified because of the copper

moiety. In fact, some of the manifestations of toxicity in the rats resembled syndromes induced by copper treatment.

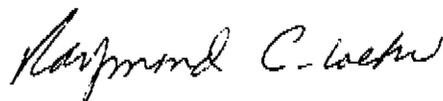
The Howard and Hanzal study yields an RfD of 0.02 mg/kg/day, based on a No Observed Adverse Effects Level (NOAEL) of 10.8 mg/kg/day, an uncertainty factor of 100 (per National Academy of Science guidelines), and a Modifying Factor of 5 (because the toxicant was administered in feed, rather than in drinking water). This RfD results in a DWEL of 0.77 mg/l of cyanide, incorporating the "standard" assumptions as to body weight, water consumption, and total exposure to the substance in question.

Despite the above recommendation, the Subcommittee must also point out that it regards the data available to calculate a DWEL as falling far short of the desirable level. The need to identify a NOAEL in one study (Howard and Hanzal cited above), and to extract a Lowest Observed Adverse Effects Level (LOAEL) from yet another study (Philbrick et al, 1979, which found reduced weight gain, thyroxine secretion rates, and thyroxine plasma levels in a small group of rats fed KCN at 1500 mg/kg of their diet for 11.5 months) emphasizes the tenuous status of these values. Without reliable dose-response data, the studies cited are probably the best available, but the need to erect policy decisions on them demonstrates the necessity to plan and execute needed research in sufficient time to support EPA decisions. The Subcommittee is also raising the issue of the proper application of Modifying Factors to the Environmental Health Committee as a subject for further study.

Detailed comments on editorial and other technical issues have been provided to the program office.

The Subcommittee appreciates the opportunity to present our views on the cyanide health criteria document. We look forward to the Agency's response to our report.

Enclosure



Dr. Raymond Loehr, Chairman  
Science Advisory Board



Dr. Arthur Upton, Chairman  
Environmental Health Committee



Dr. Bernard Weiss, Chairman  
Metals Subcommittee

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 Cyanide. The Board's major conclusion is that the proposed Drinking Water Equivalent Level (DWEL) of 0.77 mg/l of cyanide, based on the 1955 Howard and Hanzal study, is appropriate. The above recommendation notwithstanding, the Board found the supporting data far from the desirable level, and advises the Agency to plan and execute needed research sufficiently in advance to support such decision making.

Key Words: Cyanide; DWEL; drinking water

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