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

March 9, 1988

SAB-EHC-88-015

Hon. Lee M. Thomas
Administrator
U.S. Environmental Protection
Agency
401 M Street, SW
Washington, D.C. 20460

OFFICE OF
THE ADMINISTRATOR

Dear Mr. Thomas:

On October 8-9, 1987 the Drinking Water Subcommittee of the Science Advisory Board's Environmental Health Committee met to independently review an Office of Drinking Water (ODW) report to Congress entitled "Comparative Health Effects Assessment of Drinking Water Treatment Technologies." The Congress required preparation of the report when it enacted amendments to the Safe Drinking Water Act in 1986. The objective of the report is to compare the health effects resulting from the use of different drinking water treatment technologies with those prevented by biological treatment. The Office of Drinking Water requested that the Science Advisory Board review the report's scientific assumptions, data and conclusions. This letter transmits the Board's final evaluation of the report.

In conducting the review in behalf of the Board, the Drinking Water Subcommittee concludes that, within the constraints of time and available budget, the report adequately surveys the available information on health effects of chemicals involved in water treatment, including cost estimates. It is well organized by water treatment categories, although the order of the chapters is somewhat confusing. It is written in clear language that is understandable to both the scientific and lay reader. Studies are appropriately referenced to lend credibility to the report, but in many instances there are an excessive number of references. The tables and figures are presented clearly and professionally.

The Subcommittee compliments the Office of Drinking Water for the thoroughness and objectivity of the main body of the report and for clearly discussing the health issues involving drinking water that need to be addressed. For example, in the direct chlorination of drinking water, trihalomethanes and many other halogenated compounds are formed for which toxicological evaluations are incomplete. Although the health risks from these by-products appear relatively small, as compared to those from waterborne diseases, the report properly emphasizes the issue of reducing the formation of such compounds by the use of alternative disinfectants such as chlorine/chloramine, chlorine dioxide and ozone. Along with assessments that the risks in using these oxidants appear small, the report stresses the need to study the potential health effects associated with these newer disinfection technologies. The document also restates the concerns of health scientists with respect to: sodium hypochlorite, pesticides and many other man-made compounds presently detected in drinking water; and the difficulties with present methodologies for estimating carcinogenic risk of all such compounds to humans. The report has also focused major attention on the effects of corrosion and to the accumulation of metal ions (lead, mercury

chromium, iron and aluminum) in finished drinking water.

The Subcommittee strongly recommends that the document begin with an introduction that describes more completely the approach taken to satisfy the Congressional mandate to prepare the report. In particular, the rationale for the specific approach used in examining water treatment processes should be articulated. The introduction should also clearly state that there is a disparity in knowledge for the various treatment techniques.

Because the experience with some water treatment processes is more extensive than with others, the data base on both benefits and risks of these processes also varies. The report focuses on available knowledge and does not identify the major information gaps that need to be addressed in order to gather the appropriate data to support comparisons of newer treatment technologies. The introduction should briefly discuss these needs to provide the reader with a better perspective on these issues.

The Subcommittee concludes that the current executive summary is inadequate because it does not present a balanced discussion of the information contained in the body of the report. While many of the statements made may indeed be true, they are not well substantiated in the main text. This would include, for example, the statement the radon is a greater health risk than any other drinking water contaminant. There are also a number of inaccuracies or overstatements (see page nine, paragraph one, for example) that suggest that alternative treatments would entirely eliminate the disinfection by-product problem. The first section of the executive summary is questionable. There is a glaring error in omitting mention of chemical contaminants in the water supply source. Also, the removal of organic precursors prior to disinfection needs to be discussed.

The Subcommittee recommends that the executive summary should state an overall view of the body of the report. It needs to address in a direct manner, and in understandable terms, the issue of the benefits of water treatment compared to adverse health effects associated with by-products, and the health effects of non-treatment.

A list of specific technical comments suggested by the Subcommittee if more funds and time become available is attached.

Additional chapter-specific comments have already been forwarded by individual Subcommittee members to the Office of Drinking Water.

We appreciate the opportunity to conduct this particular scientific review. We request that the Agency formally respond to the scientific advice provided in this letter.

Sincerely,

Norton Nelson, Chairman
Executive Committee

Richard A. Griesemer, Chairman
Environmental Health Committee

Gary P. Carlson, Chairman
Drinking Water Subcommittee

ADDITIONAL SPECIFIC COMMENTS SUGGESTED BY THE SUBCOMMITTEE IF MORE FUNDS AND TIME WERE TO BECOME AVAILABLE.

The Subcommittee finds no discussion in the report that integrates treatment processes or the trade-offs among risks. It, therefore, recommends inclusion of such a discussion. Water treatment represents an integration of processes focused on the removal of physical, chemical and microbiological impurities. In actual practice, however, one process impacts upon the others. EPA's current regulatory approach is to focus upon one problem at a time without considering the consequences upon other needs and processes. For example, the concern over microbiological contaminants has led to the proposed filtration rule which does not consider the impact that the high concentration of disinfectant residuals will have in increasing the production of toxic by-products. The current proposed filtration rules also do not address the issues of cryptosporidium, legionella and other possible pathogens. The Office of Drinking Water needs to develop a strategy that will permit an orderly response to such new microbiological issues. The need for such a strategy should be identified in the report.

The report concludes that the risk from microbiological contaminants outweighs the cancer risk from by-products such as trihalomethanes. Implicit in this statement is the conclusion that current technology cannot minimize both problems. What is required is the development of new technologies and strategies that will define the hazard levels from both by-products and microbiological contaminants. Development of new measurement methods for identifying toxic substances and micro-organisms, along with new treatment technologies capable of minimizing both hazards, are needed.

Another example of the aforementioned integration problem is that regulations, such as those for trihalomethanes, may encourage the premature adoption of alternate disinfection processes (i.e. chlorine/ammonia and ozonation) whose efficacy and safety have not been adequately characterized. Although such deficiencies are noted in the report, the potential of new problems emerging from these and other alternative treatment processes is not mentioned.

The assessments of chemical hazard throughout the report have focused on trihalomethanes and other chemicals for which exposure and toxicologic data are available. The report largely ignores the risks due to the production of other by-products. This deficiency is reflected in the presentation of the risks in tables and charts. For example, the report stresses the effectiveness of air stripping in the removal of volatile halogenated compounds, but this technology is less effective in removing less volatile by-products. The Subcommittee recommends that the executive summary and the current chapter 3 emphasize the point that, although volatile chemicals like trihalomethanes represent an important fraction of drinking water health risks, major risks may also originate from by-products that are stable halogenated chemicals. The latter could, at a minimum, include

dichloroacetic acid, trichloroacetic acid, 2,2-dichlorobutanedoic acid, haloacetonitriles and possibly dioxin. These stable halogen-containing chemicals, when studied, have proven to be more toxic by orders of magnitude than the volatile halogenated organic materials.

Throughout the report there is a need to alert the reader that reproductive and developmental effects of disinfection by-products are largely unexplored. Hazardous levels for such effects must be considered.

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