March 26, 1996

EPA-SAB-DWC-ADV-96-001

Honorable Carol M. Browner
Administrator
U.S. Environmental Protection Agency
401 M. Street, SW
Washington, DC 20460

Subject: Advisory by the Science Advisory Board's (SAB) Drinking Water Committee (DWC) concerning EPA's Proposed Drinking Water Distribution System Research Project

Dear Ms. Browner:

On August 16-18, 1995, the Drinking Water Committee (DWC) of the Science Advisory Board (SAB) met to review, among other items, EPA's proposed Drinking Water Distribution System Research Project. At this point in the Agency's planning process, the Committee was asked to conduct an Advisory. An SAB Advisory is a peer review of an Agency work-in-progress. Typically, the Agency asks for an Advisory when it is in the midst of an extensive, complex project that would benefit from an objective, independent scrutiny of its work to date. The goal of the Advisory is to provide suggestions for mid-course corrections and/or new thrusts that will refine the trajectory of the project. The output of the Advisory is similar to that of a Review; i.e., a written report to the Administrator. Generally, an Advisory would be followed by an SAB Review of the completed Agency project at some point in the future. The Board would take steps to insure that the final Review Panel had a significant presence of new participants so as to insure an independent assessment of the Agency's work.

This letter transmits to you a summary of the Committee's comments and reactions to the Research Project and to the specific questions raised in the charge to the Committee. These questions are as follows: a) Has the Office of Research and Development (ORD) accurately characterized the research issues related to water quality in distribution systems? b) What areas should be the highest priority for research? and c) Is the current EPA role appropriate with respect to the research role of other entities?

Historically, the Agency's drinking water regulations and research programs have heavily emphasized water treatment and largely neglected the contribution of the distribution system on water quality. In recent years there has been increasing recognition that water quality changes in the distribution system must be given serious consideration from both a regulatory and a research standpoint. As a result of this concern, the Agency's Office of Research and Development (ORD) presented the above tentative charge to the SAB's Drinking Water Committee. The Committee recommends modification of the charge to recognize that the proposed research project is not intended to be a comprehensive distribution system research plan, but is focused primarily on microbiologically related distribution system research issues.

In our view, the tentative charge is too broad. ORD's proposed Drinking Water Distribution Systems Research Project is not, nor was it intended to be, an exhaustive listing of distribution system research issues. Rather, the proposed research is focused primarily on microbiologically related distribution system research issues. Issues such as corrosion, taste and odor, and the effects on water quality of indirect additives from distribution system components are not addressed.

a) Has ORD accurately characterized research issues related to Water Quality in Distribution Systems?

The Committee believes that ORD's characterization of research issues is accurate and is pleased to note the strong emphasis given to microbiological issues. However, the Committee recommends the development of a research plan that allows ORD to better prioritize research issues on the basis of human health risks. Greater consideration needs to be given to the design and operational implications of research efforts.

The areas proposed for research on the microbiology of drinking water distribution systems appear to have potential overlap with the proposal entitled "Health Significance of HPC Bacteria from GAC Treatment Devices" by Dr. Stelma of EPA's National Exposure Research Laboratory[1]. In the Drinking Water Committee's review of that proposal, it was suggested that the "EPA drinking water research program should have a plan designed to characterize microbiota and their microbial ecology in drinking water distribution systems, in

[1] This was a presentation at the August 16-18, 1995 DWC meeting. The DWC conducted an Advisory on this issue which is reflected in: *Advisory by the Science Advisory Board's (SAB) Drinking Water Committee (DWC) concerning the Health Significance of HPC Bacteria Eluted from POU/POE (Point of Use/Point of Entry) Drinking Water Treatment Devices*. EPA-SAB-DWC-ADV-96-002, March 1996.

consumer plumbing and at the consumer's tap, and identify their human health effects". The Committee believes that both of these programs would be strengthened by interaction between the microbiologists and engineers and coordination of their research programs related to the microbiology of drinking water distribution systems.

b) What areas should be the highest priority for research?

The Committee finds it difficult to prioritize areas of research in the absence of a risk-based research plan; however, even in the absence of a risk-based prioritization, several areas of proposed research appear to merit a high priority. High priority areas for research include the development of kinetic models for chlorine decay in distribution systems, enhancement of the EPANET distribution system water quality model, and research related to opportunistic pathogens in distribution system biofilms.

The Committee highly commends ORD for its work on APPEND. This software provides a highly effective, low-cost model which accurately depicts distribution system performance. Water quality modeling software is often developed at great expense but has little practical value. APPEND is a sparkling exception. The Committee highly recommends that the model be further enhanced, as proposed.

Design and operational implications of distribution system research - The Committee strongly recommends that ORD be sensitive to the practical implications of its research on the design and operation of drinking water distribution systems. Research needs to be taken to the point where the Agency can develop practical guidelines for design and operation of water distribution systems. Practical issues such as minimization of disinfectant residual decay, minimization of HPC and other opportunistic pathogens, and minimization of biofilms in the distribution system need to be considered. Design and operation of drinking water storage reservoirs can be greatly improved by conducting appropriate research. Baffling of reservoirs, design of inlet-outlet structures and using air and/or water pumping to mix reservoirs could lead to significant water quality improvements. These, and many other distribution system enhancements, can be effectively evaluated if research projects are conducted keeping such design and operational considerations in mind.

In reality, water utilities often operate distribution systems to minimize pumping and other operational costs with little thought being given to the water

quality impacts of such decisions. The development of Agency guidelines for thedesign and operation of distribution systems would be a valuable aid to water utilities in balancing operating costs and water quality considerations.

c) Is the current EPA role appropriate with respect to the research role of other entities?

The research role of EPA is largely established by law. The Agency's role with respect to other entities such as the American Water Works Association Research Foundation (AWWARF) and other research organizations, including private sector research groups, appears appropriate. The Agency should continue to leverage research efforts by partnering with AWWARF and other research groups, including the private sector.

The Committee believes that the Agency's proposed Drinking Water Distribution System Research Project is appropriately focused on microbiologically related research issues; however, a comprehensive research plan is needed which is based on human health risk prioritization. High priority should be given to future research related to kinetic models for chlorine decay in distribution systems, enhancement of the APPEND model, and research related to opportunistic pathogens in biofilms. Drinking water distribution system research needs to be conducted with the goal of developing practical guidelines for the design and operation of distribution system pumps, piping and storage facilities.

Thank you for the opportunity to provide our input at an early stage in the development of this Research Project. We look forward to providing further advice and assistance as the Research Project is developed.

Sincerely,

Genevieve M. Matanoski

Dr. Genevieve M. Matanoski, Chair
Executive Committee

Verne R. Ray

Dr. Verne Ray, Chair
Drinking Water Committee

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Mrs. Mary L. Winston, Staff Secretary, Science Advisory Board (1400-F), U.S. EPA, 401 M Street, SW, Washington, DC 20460 (202) 260-6552 - FAX (202) 260-7118

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