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

January 16, 1987

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

SAB-EC-87-019

DATE OF THE APPROVAL

Dear Mr. Thomas:

The Science Advisory Board has conducted a series of scientific reviews of Agency research programs that have proven to be a highly useful means of assessing the quality and relevance of existing research, identifying research needs and involving the scientific community in the research planning process. Such reviews have also aided internal communication within the Office of Research and Development (ORD) and between ORD and the program offices.

The specific research programs SAB has reviewed since January 1986 include the following:

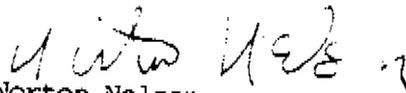
- Dioxins
- Biotechnology
- Extrapolation Modeling
- Water Quality
- Ecological Risk Assessment
- Alternative Hazardous Waste Control Technologies
- Superfund Innovative Technologies Evaluation
- Indoor Air Research Plan
- Integrated Air Cancer Project
- Radon Mitigation Program
- FY '88 Budget Proposal for the Office of Research and Development

In addition, the Science Advisory Board is scheduled to conduct scientific reviews for the following research programs later this fiscal year: advances in neurotoxicology, health effects of disinfectants and disinfectant by-products; acid deposition; radon and indoor air; biological control agents; effectiveness of asbestos removal processes; control of water quality in water distribution systems; land disposal; and waste minimization.

The purpose of presenting this information is to inform you that such reviews have focused both the SAB's and the Agency's thinking on research plans and needs to a degree never before achieved through preparation and review of the Five Year Research and Development Plan (Research Outlook). As you know, Congress has required that the Agency provide the SAB with the opportunity to review the Plan. The Board believes that its extensive research program reviews fulfill the spirit and intent of Congress for SAB oversight of the Agency's research program. Comments on specific issues in the five year plan have also been addressed in individual research program reviews.

The Board reiterates its long-standing support of research directed to address problems beyond the immediate regulatory needs of the Agency. It is preparing a separate report on this and other issues as it reviews the proposed research budget for Fiscal Year 1988.

Sincerely,

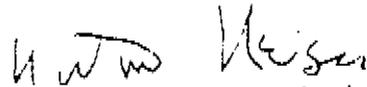


Norton Nelson
Chairman
Science Advisory Board

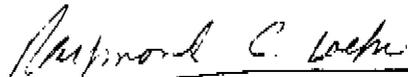
The attached report contains more detailed responses to these issues.

We are pleased to have had the opportunity to be of service to the Agency and look forward to a written response to our report.

Sincerely,



Norton Nelson, Chairman
Executive Committee
Science Advisory Board



Raymond Loehr, Chairman
Environmental Engineering Committee
Science Advisory Board



Paul Roberts, Chairman
Unsaturated Zone Code Subcommittee
Environmental Engineering Committee

cc: W. Porter
S. Lowrance
J. Denit
S. Weil
M. Strauss
Z. Saleem

The Subcommittee believes that there are no serious problems associated with treating the fluid as incompressible, isothermal, and homogeneous. The acceptability of all the other assumptions hinges on the application of the model. Certain classes of phenomena are not well enough understood to be incorporated into a management model of the kind reviewed here. Because of the importance of these phenomena to site-specific applications, there is an urgent need for scientific research to clarify the scientific principles underlying these phenomena. Such research would have benefits beyond this model. The FECTUZ model package is also subject to limitations imposed by its simplifying assumptions and the scarcity of data necessary for parameter estimation. Both versions of the model are incomplete in the sense that several potentially important governing processes are neglected altogether. The Subcommittee believes these limitations are not so debilitating as to preclude its employment for generalized regulatory development applications, but believes that the inability to take into account several potentially relevant processes casts serious doubt on the advisability of site-specific applications. It is recommended that the Agency mount directed and continuing efforts (a) to improve the knowledge base concerning relevant processes which have been neglected on grounds of inadequate understanding, and (b) to seek expert consensus in these areas, especially biotransformation, immiscible transport, and fracture transport.

The Subcommittee finds that for the intended tasks in regulatory development, the composite model consisting of FECTUZ-A and EPA-SMOD is acceptable from the standpoint of simplicity and computational ease. Where Monte Carlo replication of the model is planned, the overall uncertainty of the transport model should be addressed because the Monte Carlo methodology is not able to account for uncertainties arising from incompleteness or deficiencies in the underlying model. However, for site-specific decisions where the accuracy and completeness of representation of transport and transformation processes is of paramount importance, the FECTUZ model seems bound to be inadequate, especially the analytical version owing to its implicit simplifications and its inability to take into account temporal variations, site-specific conditions and heterogeneity. The Office of Solid Waste should take special care to warn potential users against site-specific applications of the composite model, because there is a substantial danger that such usage could be misleading and detrimental to the protection of groundwater quality.

Additionally, the Subcommittee has expressed concerns and made suggestions relating to how the Agency establishes the need for the development of a new model, how existing models are evaluated, and on the existence and use of adequate in-house capability for evaluating issues related to transport model development and application.