

THE SCIENCE ADVISORY BOARD: MAKING PROGRESS

ANNUAL REPORT OF THE STAFF DIRECTOR OF THE SCIENCE ADVISORY BOARD FOR FISCAL YEAR 1991

DISCLAIMER

This report is an SAB Staff summary of activities of the U.S. Environmental Protection Agency's Science Advisory Board for Fiscal Year 1991, with projections for Fiscal Year 1992.

The report has not been formally reviewed by the Board or the Agency and should not be construed as representing the views of either organization.

ABSTRACT

This sixth Annual Report of the Staff Director of the Science Advisory Board (SAB) provides background information on the Board: its origins, authorities, and function. The roster of the SAB's Members and Consultants, meetings of SAB committees, and abstracts of the reports submitted to the Administrator during FY 91 are included in the report.

A number of the Board's activities are highlighted for special attention, including the review of the effects of electromagnetic fields by the Radiation Advisory Committee, a review of environmental tobacco smoke effects by the Indoor Air and Total Human Exposure Committee, and a joint examination of wetlands issues by the Ecological Processes and Effects and Environmental Engineering Committees. The Board's continued focus on the Agency's followup and implementation of the *Reducing Risk* report are also described.

The emphasis given to "making progress" during FY 91 has included major improvements in the level of computer capability in the Staff Office, including the installation of a Local Area Network (LAN) linking SAB staff at both the Waterside Mall and Fairchild Building locations, the acquisition of an optical scanning system, and the provision of a computer for every staff member.

FY 92 should see a continuation of the trend toward making progress and working more effectively with both the Agency and with the public. This will result, in part, from continued implementation of the recommendations of previous management and "self" studies, as well as the adoption and implementation of the concepts embodied in "Total Quality Management (TQM)" as all SAB staff receive formal TQM training. All of these efforts will stand the SAB in good stead as it confronts a growing number of requests for advice/review on increasingly complex and contentious issues in protecting public health and the environment.

FOREWORD

As noted in the titles of past two annual reports of the SAB Staff Director, the Board has been "making a difference" and "working smarter". I am pleased to report that this year we are "making progress."

For example, the issuance of the *Reducing Risk* report, in September, 1990, set the stage for an intensive year of implementation and follow-up within the Agency. Administrator Reilly and Deputy Administrator Habicht have been enthusiastic recipients of the report, featuring it in speeches to audiences outside of EPA and implementing it through initiatives inside the Agency. SAB members and Staff have made dozens of presentations to various audiences across the country. The Chair of the Executive Committee, Dr. Loehr, joined Mr. Reilly as sole witnesses in a hearing before the U.S. Senate delving into the concepts developed in the report. With 20,000 printed copies of the report in distribution, *Reducing Risk* is certainly the SAB's "best seller" and continues to attract attention at the Federal, State, and local levels.

In terms of impact, however, *Reducing Risk* must share the spotlight with several of the Board's other efforts this year. In this issue of the Annual Report, the reader will find descriptions of highly publicized reviews (e.g., risk assessment of environmental tobacco smoke and electromagnetic fields) and reviews (e.g., the Office of Research and Development's innovative Environmental Monitoring and Assessment Program (EMAP) activities, and several aspects of the Office of Air and Radiation's indoor air radon program) that--while receiving less public attention--could have a substantial impact on public health and environmental protection in this country and beyond.

And yet, it must be recognized that each of the more than three dozen topics attracting attention from the Board this past year was selected from a list of more than 150 requests for SAB review. Therefore, the Board and the Staff are working closely with the Agency to insure that that one-out-of-four-requests selected will make a truly significant contribution to assuring that EPA conducts its business on the basis of sound scientific principles.

This Annual Report also contains important information about the history of the Board, its mode of operation, its personnel, abstracts of its FY 91 reports, a summary of FY 91 highlights, and projections for FY 92. Our goal is to demonstrate that the SAB is making progress today and setting the stage for further advances tomorrow.

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Staff Director
Science Advisory Board**

December, 1991

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1. EXECUTIVE SUMMARY

1.1 Introduction to the Report

This purpose of this report is three-fold:

- a. To provide a succinct introduction to the Science Advisory Board (SAB).**
- b. To provide a summary of the SAB activities for fiscal year (FY) 1991.**
- c. To offer a near-term projection of future SAB activities.**

Section 2 is a brief introduction to the Report. Section 3 provides background information on the SAB, its organization, history, membership, and procedures. It includes specific examples of the way in which the SAB is making progress. Section 4 contains the summaries of activities of each of the SAB Committees during FY 91. Examples of the ways that the SAB Staff Office is "making progress" are included. Section 5 contains some projections for FY 92.

The Report also includes a number of specialized appendices: charters, organizational charts, membership lists, lists of meetings, abstracts of FY 91 reports, and information about the SAB Staff.

1.2 Introduction to the Board

The purpose of the Board is to provide independent scientific and engineering advice to the Administrator of EPA on scientific and engineering issues associated with the work of the Agency (See charters in Appendix A). The SAB often functions as a peer review panel, assessing the scientific rationales underlying current or proposed Agency positions. In recent years, however, it has initiated a number of activities on its own; e.g., the study of Agency's scientific approaches to lead and the study of leachability of hazardous wastes.

The SAB was formally chartered in 1978 by the Environmental Research, Development, and Demonstration Authorization Act, although its roots extend back to the birth of EPA in 1970 and beyond. The Board is a Federal Advisory Committee, complying with the Federal Advisory Committee Act, and is composed of non-governmental scientists and engineers appointed by the EPA Administrator. The roughly 60 members of the Board (see Appendix E) are appointed by the

Administrator and conduct their business through eight Committees, coordinated through an Executive Committee (See the organizational chart in Appendix B and a list of committee structures in Appendix C). The members of the Board are some of the most qualified scientists and engineers in the country, as evidenced by the credentials of the FY 91 Committee Chairs (See Table II). The work of the Board is supported by a cadre of more than 250 consultants to the Board (see Appendix E), who are also non-governmental scientists and engineers, appointed by the SAB Staff Director. Scientists employed by the Federal Government who have special skill or expertise in particular areas participate as Liaison Members on several Committees, as needed.

The SAB is supported by a Staff Office of 16 persons and an FY 91 budget of some \$1.7 million (See Tables III and IV). These resources enabled the Board to conduct 47 meetings and issue 16 full reports and six letter reports.

The SAB carries out projects at the request of the Agency, at the request of Congress, and on its own volition. In recent years, the number of requests for SAB action have been 3-5 times the number that the Board can address. Therefore, the Board has adopted criteria for use in establishing priorities among the various requests:

- a. Impact on overall environmental protection
- b. Address novel scientific problems or principles
- c. Integrate science into Agency actions in new ways
- d. Influence long-term technological development
- e. Respond to emergencies
- f. Deal with problems that transcend federal agency or other organizational boundaries.
- g. Strengthen the Agency's basic capabilities
- h. Serve Congressional and other leadership interests

The reports produced by the SAB have a positive impact on many aspects of the Agency's operations and policies, to wit:

- a. The rigor of the Agency's technical positions
- b. The specific areas to which the Agency allocates resources for scientific and technical activities
- c. The directions taken by emerging science policy
- d. The directions taken by the Agency's planning
- e. The directions and form of public debate of scientific and engineering issues

Of particular note, in terms of the Boards's "making progress" and affecting major aspects of EPA's operations in FY 91, were reviews of

- a. The Agency's implementation of the *Reducing Risk* report.
- b. The Board's involvement in risk-based strategy for wetlands research.
- c. The Board's review of the Agency's risk assessment of the carcinogenic effects of electromagnetic fields.

With all of these activities, attention and impacts, the Board has maintained a broad base of support both within and outside the Agency. In particular, the current Administrator and Deputy Administrator have been strong supporters of the SAB.

1.3 Review of FY 91 Activities

During FY 91 the eight SAB Committees conducted 46 public meetings and one closed meeting, all of which were announced in the Federal Register. Additional meetings were held for planning, writing, and administrative purposes. A wide variety of topics were covered: from health effects of specific chemicals (e.g., nitrates and perchloroethylene) to techniques for more general use (e.g., use of computer models in hazardous waste and Superfund programs). Appendices F and G contain a full listing of FY 91 SAB meetings and reports, including abstracts.

In addition to its traditional activities of holding SAB meetings and producing reports, FY 91 was unique in that the Board and the SAB Staff took steps to develop ways of "making progress" by rebuilding the infrastructure that enables the Board to do its work. These including the following:

- a. Continued implementation of the recommendations of the Mission and Functioning report that was received in October, 1989.

Additional acquisitions, per the recommendations of the 1989 Management and Organization report, of modern computers and related systems, including a Local Area Network (LAN), an image and character scanning system, and laptop computers for use at meetings.

- c. Continued the use of Annual Meetings of the SAB to involve Members in determining the Board's long-range view that provides direction for the Staff.
- d. Continued development of formal procedures for setting the agenda for the SAB, involving many of the Board's constituencies, including the Executive Committee, the Administrator's Office, the Assistant Administrators, Regional Administrators, and the EPA program offices--much of the activity coordinated through the SAB Consultative Group.
- f. Strengthened personnel structure that provides additional management assistance to the Board and the Staff; i.e., filling the positions of Assistant Staff Director and Program Assistant.
- g. Rotated Staff responsibilities to align better individual capabilities and the existing workload.

1.4 Projections and Conclusions

FY 92 should be an exciting and busy time for the SAB. There will be several activities associated with completing tasks started in FY 91, as well as a range of on-going efforts related to the FY 90 *Reducing Risk* project.

The FY 92 agenda-building exercise, although not yet completed, has surfaced many important issues, some of which will generate considerable public interest; e.g., reviews of health risk assessment guidelines for cancer and non-cancer effects, review of the first stages of the Agency's ecological risk assessment guidelines, and review of the Agency's reassessment of the risks posed by "dioxin." In addition, as in the past, FY 92 is likely to bring a number of important topics that cannot be anticipated at this time.

The Board itself will undergo a significant restructuring in FY 92. The fledgling Environmental Economics Advisory Committee (EEAC)--requested by the Administrator in his response to the SAB's *Reducing Risk* report--will become operational, investigating a number of important issues of how economic analysis is applied to environmental problems. In addition, the Clean Air Act Compliance Analysis Council (see Section 812 of the Clean Air Act Amendments of 1990) is likely to become a distinct entity under the administrative umbrella of the SAB in a manner similar to CASAC. The startup phases of both these groups are likely to attract considerable attention from the Board, the Agency, the Congress, and the public.

The Staff Office will join the Agency-wide movement to the employment of Total Quality Management (TQM), starting with formal training for all members of the staff. Careful analysis of the Office's "customers" and "suppliers" and its capability to meet the needs of the Board, the Agency, and the public for accurate, timely, and effective advice on issues of health and environmental protection should lead to additional improvements in our service to our constituents in the future.

2. INTRODUCTION TO THE REPORT

2.1 Purpose of the Report

The Science Advisory Board (SAB) is a legislatively mandated group of non-governmental scientists, engineers, and economists, charged with providing independent technical advice on environmental issues to the Administrator of the U.S. Environmental Protection Agency and others; e.g., Congressional committees. Generally, the SAB does not get involved in or provide advice on regulatory policy aspects of problems confronting the Agency, since such matters are the province and responsibility of the EPA Administrator. Additional details of the objectives, responsibilities, composition, and activities of the SAB are included in the charter of the organization (See Appendix A).

Informed observers acknowledge the SAB's remarkable history and its continuing importance in the protection of public health and the environment. However, some people both within and outside of the Agency are hard-pressed to describe the extent of the Board's activities or the detailed nature of its findings. This is due, in part, to the complex structure of the Board and the aperiodic issuing of its reports. To some, the SAB is viewed as a hurdle which must be cleared on the way to issuing regulations; much like having to defend one's thesis on the way to getting an advanced degree. To others, the SAB is seen as a court of last resort in which competing scientific arguments are objectively and dispassionately evaluated.

For some puzzled observers of the SAB, the biggest problem is simply finding out "What does the SAB do?" A somewhat flippant, but accurate, answer to that question is: "The SAB makes a difference." For example, the SAB makes a difference in the type and conduct of scientific and engineering research at EPA. The SAB makes a difference in the way in which the resulting data are interpreted and used to support regulatory positions. The SAB also makes a difference to SAB members and consultants (M/Cs) and SAB staff by giving them the satisfaction of seeing their information and guidance used appropriately by the Agency to address environmental problems.

This Report is intended to reveal the SAB to a wide audience: to those inside the Agency, to those outside the Agency, to those who understand the Board, to those who think they understand the Board, and to those who know enough to

know that they don't understand the Board. The intent is that each reader gain a broader perspective of the SAB, its activities, and its impact.

Specifically, the purpose of the Staff Director's Annual Report is three-fold:

- a. To provide a succinct introduction to the SAB.
- b. To provide a summary of the SAB activities for fiscal year 1991.
- c. To offer a near-term projection of future SAB activities.

In short, the Report is designed to provide "a group photograph" of the SAB--its people, its products, and its prospects--in sufficient detail that the interested reader can distinguish the major features and identify paths for investigating the finer details.

2.2 Content of the Report

The Report consists of five principle sections, plus appendices which supplement the discussion in the main sections. Following the Executive Summary (Section 1) and this Introduction (Section 2), Section 3 provides basic background information on the SAB. Here the reader will find brief discussions on the history of the Board, its organization and membership, and its principal activities and procedures. Specific examples are described that illustrate the way in which the SAB impacts positively on the functions and operations of the Agency.

Section 4 focuses on SAB activities during FY 91. This portion of the Report contains descriptions of the activities of each of the Board's Committees during the past year. Specific examples are given of the way in which FY 91 was a year of "making progress." In addition, changes in the SAB Staff and operations of the Office are highlighted.

Section 5 provides a glimpse into what FY 92 holds in store for the Board. Significant topics have already been identified, and some reviews planned; additional issues will arise during the course of the year.

The Appendices contain important information, such as organizational charts, membership lists, abstracts of reports, and the like. They provide a source of more detailed information about specific aspects of the SAB.

3. INTRODUCTION TO THE BOARD

3.1 SAB Formation, Authority and Function

The Science Advisory Board (SAB) was established by Congress to provide independent scientific and engineering advice to the Administrator of the Environmental Protection Agency (EPA) on the technical basis for EPA regulations. Expressed in terms of the current parlance of the risk assessment/risk management paradigm of decision making (National Research Council, *Managing Risk in the Federal Government*, 1983), the SAB deals with risk assessment (hazard identification, dose-response assessment, exposure assessment and risk characterization) and only that portion of risk management that deals strictly with the technical issues associated with various control options. Issues of Agency and Administration policy are generally beyond the scope of SAB mandate and involvement.

The SAB, in its present form, was established in 1978 by the Environmental Research, Development, and Demonstration Authorization Act (ERDDAA) (42 U.S.C. 4365). Predecessor bodies date back to the early 1970s. In carrying out the mandate of ERDDAA, the SAB provides "such scientific advice as may be requested by the Administrator, the Committee on Environment and Public Works of the United States Senate, or the Committees on Science and Technology, Interstate and Foreign Commerce, or Public Works and Transportation of the House of Representatives". Because the Science Advisory Board is a Federal Advisory Committee, it must comply with the Federal Advisory Committee Act (FACA) (5 U.S.C. App. C) and related regulations. Consequently, the Board has an approved charter, which must be renewed biannually, announces its meetings in the *Federal Register*, and provides opportunities for public comment on issues before the Board.

As a practical matter, the function of providing credible technical advice to EPA and Congress antedates ERDDAA and its nascent SAB. The roots of the SAB can be traced back through various predecessor committees within EPA and--prior to the creation of EPA--into other agencies, such as the Department of Health, Education and Welfare. Since 1978, however, the SAB has operated as a Staff Office, reporting directly to the Administrator.

Members of and consultants to the Board constitute a distinguished body of engineers and scientists who are recognized, non-governmental experts in their

respective fields. These individuals are drawn from academia, industry, and environmental communities throughout the United States and, in some limited cases, other countries.

Increasingly, the Agency has placed a premium on basing its regulations on a solid technical foundation. Therefore, during the past 13 years the SAB has assumed growing importance and stature. It has become formal practice that many major scientific points associated with environmental problems are reviewed by the SAB. For example, the Clean Air Act (CAA) requires that decisions related to the National Ambient Air Quality Standards (NAAQS) be reviewed by the Clean Air Scientific Advisory Committee (CASAC), which is administratively housed within the SAB.

Also, many of the standards being proposed under the Safe Drinking Water Act are brought to the Board for review. In addition, reviews of a more cross-media nature, such as the reassessment of carcinogenic potency of 2,3,7,8-TCDD ("dioxin"), and of Agencywide scientific approaches to assessing the significance of lead pollution, are becoming more common.

Generally, the Board functions as a scientific and engineering peer review panel. The SAB conducts its business in public view and benefits from public input during its deliberations. Through these proceedings Agency positions are subjected to critical examination by leading experts in the field in order to test the currency and technical merit of those positions. At the same time, the SAB recognizes that EPA is sometimes forced to take action to avert an emerging environmental risk before all of the rigors of scientific proof are met. To delay action until the evidence amounts to incontrovertible proof might court irreversible ecological and health consequences. In such cases, the Agency makes certain assumptions and extrapolations from what is known in order to reach a rational science policy position regarding the need (or lack thereof) for regulatory action. Here, the SAB serves as a council of peers to evaluate the soundness of the technical basis of the science policy position adopted by the Agency.

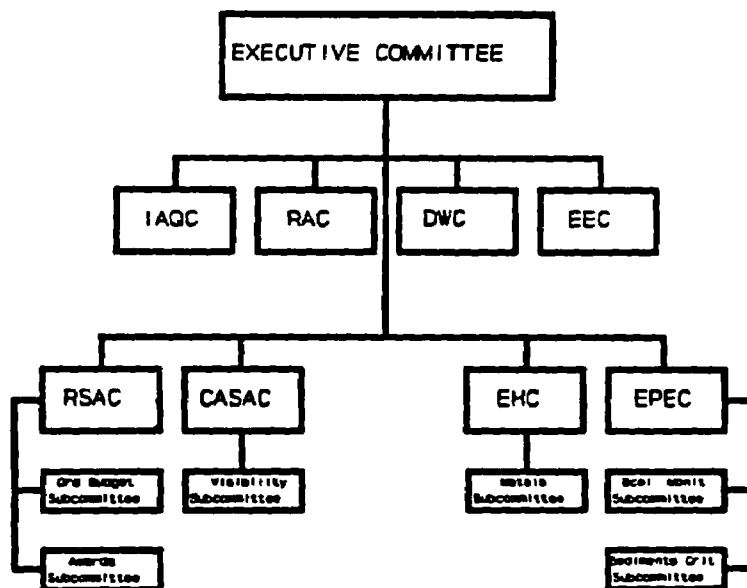
3.2 SAB Organization and Membership

The SAB Charter (Appendix A) states that "The objective of the Board is to provide advice to EPA's Administrator on the scientific and technical aspects of environmental problems and issues," that "The Board will consist of a body of independent scientists and engineers of sufficient size and diversity to provide the

range of expertise required to assess the scientific and technical aspects of environmental issues," and that "No member of the Board shall be a full-time employee of the Federal Government." The Charter requires formation of an Executive Committee and inclusion of the Clean Air Scientific Advisory Committee (see separate charter, also in Appendix A). Otherwise the Board may organize itself as needed to meet its responsibilities.

The Board's Executive Committee serves as the focal point for the coordination of scientific reviews by the Board's standing committees. Appendix B contains a chart of the FY 91 SAB organization, which appears in Figure I with long-standing subcommittees displayed. The Executive Committee meets four times a year to act on Agency requests for reviews, hear briefings on pertinent issues, initiate actions/reviews by the Board which it feels are appropriate, and approve final reports prior to transmittal to the Administrator. (Reports from CASAC are submitted directly to the Administrator, without need for prior Executive Committee approval.)

FIGURE I SAB Committee Structure



Five Committees have historically conducted most Science Advisory Board reviews:

- Clean Air Scientific Advisory Committee (CASAC)
- Ecological Processes and Effects Committee (EPEC)
- Environmental Engineering Committee (EEC)
- Environmental Health Committee (EHC)
- Radiation Advisory Committee (RAC)

In recent years three additional committees have been added:

- Drinking Water Committee (DWC, Evolved from the EHC in FY90)
- Indoor Air Quality/Total Human Exposure Committee (IAQC, mandated in the Superfund Amendments and Reauthorization Act in FY 86)
- Research Strategies Advisory Committee (RSAC, requested by the Administrator in response to SAB recommendations in FY 88).

The activities of these committees are supplemented by a variety of subcommittees (See Figure I), as well as by ad hoc subcommittees which are created as required.

The Board has been successful in tapping a continuing vein of top technical talent to fill its leadership positions. The scientists and engineers who have led the SAB for the past 15 years are listed in Table I. Table II testifies to the caliber of individuals who have served as chairs of SAB Committees in FY 91.

Although the number of appointed members is flexible, the FY 91 SAB consisted of 62 members, appointed by the Administrator, generally for two year terms, renewable for two more terms in some cases. Service as Committee Chair can lead to an additional four years of continuous service. A formal guideline on membership service was adopted by the Executive Committee in making FY 91 appointments (See Appendix D). More than 250 additional scientists and engineers, invited by the Staff Director, serve on an "as needed" basis as consultants to the Board on various issues where their expertise is relevant. The number of consultants is also flexible, and their one year terms can be renewed. Consultants are required to meet the same standards of scientific expertise as members.

The term "member or consultants (M/C)" is used throughout this report to refer to these outside technical experts. Appendix E contains a list of the FY 91 M/Cs on the Board. Nearly all of them serve as "special Government employees

TABLE I SAB Leadership Over the Past Two Decades

Executive Comm. Chairs	Affiliation	Date
Dr. Emil Mrak	University of California	1974-1978
Dr. John Cantlon	Michigan State University	1979-1981
Dr. Earnest Gloyna	University of Texas	1981-1983
Dr. Norton Nelson	New York University	1983-1988
Dr. Raymond Loehr	University of Texas	1988-present

SAB Staff Directors	Date
Dr. Thomas Bath	1975-1977
Dr. Richard Dowd	1978-1981
Dr. Terry Yosie	1981-1988
Dr. Donald Barnes	1988-present

(SGEs)," subject to all appropriate restrictions, including conflict of interest statutes (18 U.S.C. Sections 202-209).

The SAB Staff consists of a cadre of full-time EPA employees: a Staff Director, Assistant Staff Director, five scientist/engineer Designated Federal Officials (DFOs) (formerly called "Executive Secretaries"), a Project Coordinator, a Program Assistant, seven Staff Secretaries, one clerk, and one receptionist. Their duties include identifying potential issues for SAB attention, focusing questions for review by the Board, working with the Board to identify and enlist appropriate M/Cs, interfacing between the Board and the Agency and the public, coordinating logistics for reviews, and producing minutes and reports for submission to the Administrator. Appendix C contains information on the Staff support within each of the Committees.

TABLE II FY 91 SAB Committee Chairs

Executive Committee (EC)

Dr. Raymond Loehr
H.M. Alharthy Centennial Chair and Professor, Civil Eng. at the University of Texas at Austin. Member, Nat. Academy of Engineering
Member, Soc. of Env. Tox. and Chemistry
Member, Water Poll. Control Federation
Member, Am. Society of Civil Engineers
Former Chair, SAB Env. Engineering Comm.

Clean Air Scientific Advisory Committee (CASAC)

Dr. Roger McClellan
President of the Chem. Ind. Inst. of Toxicology
Member, National Institute of Medicine
Member, Am. Veterinary Medical Assoc.
Member, Radiation Research Society
Member, Society of Toxicology

Drinking Water Committee (DWC)

Dr. William Glaze¹
Chairman, Department of Environmental Sciences and Engineering, School of Public Health, University of North Carolina
Member, American Chemical Society
Editor, Env. Sciences and Technology
Member, Am. Public Health Association
Member, Am. Inst. of Chemical Engineers
Member, Am. Waterworks Association

Environmental Processes and Effects Committee (EPEC)

Dr. Kenneth L. Dickson
Director, Institute of Applied Sciences and Dept. of Bio. Sci., N. Texas State University
Member, American Fisheries Society
Member, Soc. of Env. Tox. and Chemistry
Member, N. American Benthological Soc.
Member, J. K. G. Silvey Society

Environmental Engineering Committee (EEC)

Mr. Richard Conway
Senior Corp. Fellow, Union Carbide Corp.
Member, Nat. Academy of Engineering
Diplomate, Am. Acad. of Environ. Eng.
Fellow, Am. Soc. of Civil Engineers
Member, NRC Water Sci. & Technology Board Affiliates Member, Assoc. of Env. Eng. Prof.
Member, Soc. of Environ. Tox. & Chemistry
Member, Amer. Inst. for Pollution Prev.

Environmental Health Committee (EHC)

Dr. Arthur Upton
Professor and Director, Institute of Environmental Medicine, New York Univ.
Member, American Assoc. for Cancer Res.
Member, Assoc. of Path. and Bacteriologists
Member, American College of Toxicology
Member, American Society for Exp. Path.
Member, Radiation Research Society
Member, Soc. for Exp. Biology & Medicine
Member, Society for Risk Analysis

Indoor Air Quality/Total Human Exposure Committee (IAQC)

Dr. Morton Lippmann
Director of Aerosol Inhalation Research Laboratory and Professor, Institute of Environmental Medicine, New York Univ.
Member, Am. Conf. of Gov. Ind. Hygienists
Member, Am. Academy of Indust. Hygiene
Member, Am. Industrial Hygiene Assoc.
Member, American Thoracic Society
Member, Am. Assoc. for Aerosol Research

Radiation Advisory Committee (RAC)

Dr. Oddvar Nygaard
Professor of Radiology and Biochemistry, Case-Western Reserve University
Member, Radiation Research Society
Member, Environmental Mutagen Society
Member, American Chemical Society
Member, Society of Sigma Xi

Research Strategies Advisory Committee (RSAC)

Mr. Alvin Alm
Director, Senior Vice President, Environmental Technology Group, Science Applications International Corporation
Member, Nat. Academy of Public Admin.
Member, Board of Directors of Environmental Law Institute

¹ Resigned during FY 91; Dr. Verne Ray served as Acting Chair for the balance of the year.

3.3 SAB Activities

3.3.1 Overview

The types of projects and the range of subjects reviewed by SAB continue to grow. The Board takes on reviews at the request of Congress, the Administrator

and program offices, as well as on its own initiative. In general, the trend over time has been for more SAB reviews, addressing more varied subjects, requested by a wider range of individuals and organizations. In addition, recent requests have been for more complex, interdisciplinary, multi-media reviews, such as the Agency's analysis of global climate issues, an in-depth examination of strategies to guide environmental research during the 1990s, and evaluation of relative risks posed by a wide array of environmental problems that confront the Agency.

The magnitude of SAB activity has increased dramatically during the past 10 years. Tables III - V provide summary information on the Board's activities and resources as a whole and on a major committee basis. Note however, that the number of meetings and reports in FY 91 showed a decrease when compared with FY 90. This decline results from several factors: first, it is apparent that the Board's review topics are increasing in complexity, and in the degree of public interest, scrutiny, and involvement--all of which requires additional staff time. The Environmental Tobacco Smoke (ETS), cancer and electromagnetic fields (EMF), perchloroethylene, and formaldehyde reviews all fall into this category. Second, at a time when these demand were increasing, the contributions of several staff members were lost to other worthy activities; for example, Bob Flaak served in the Gulf War, Rick Cothorn took a rotational assignment to the Agency's emerging statistical analysis staff, and Samuel Rondberg filled in for Mr. Flaak's management and DFO functions while continuing to maintain the EHC and initiating the new economics committee. Lastly, the acquisition of a new level of computer equipment, while promising to contribute to increased productivity in the future, has absorbed staff time in configuring systems, initial trouble shooting, staff training, and the like.

From a broader perspective, it should be noted that the Board has prepared nearly 300 reports during the past decade. Each report was sent directly to the Administrator, with copies available to the public upon request. Distribution varies with interest in the topic. Some are circulated to fewer than 100 readers. A "best seller" typically results in distribution of 1000 copies in two years. The recent FY 88 *Future Risk* report on strategies for the Agency's research in the 1990s achieved a distribution of more than 7000 copies. More than 20,000 copies of the FY90 report, *Reducing Risk*, have been printed and distributed by the Agency. Additional copies have been distributed by the National Technical Information System (NTIS). Taken in ~~total~~, the number of SAB reports circulated during the past 10 years is over 100,000 copies.

Table III SAB Activities and Resources, 1980-1991

	Fed. Reg. ¹ meetings		Other ² meet.	# of Reports ³			# of Members	Staff FTEs	Oper. Costs (rounded \$50K)
	Open	Closed		Full ^a	Ltr ^b	Total ^b			
1980	42	1				13	81	15.8	875
1981	12	1				10	72	13.2	750
1982	20	0				10	37	10.5	600
1983	38	1				11	44	9.1	650
1984	29	1				17	48	14.1	1,050
1985	60	1				41	60	14.0	1,200
1986	61	1				28	59	14.1	1,200
1987	57	1				36	74	14.1	1,350
1988	58	1				43	74	13.2	1,400
1989	67	1				38	61	14.9	1,550
1990	60	1	5	26 ^c	7	33	55	15.0	1,700
1991	46	1	7	16	6	22	62	16.6	1,700

1 Announced in the Federal Register, per FACA.

2 Writing, planning, and administrative sessions do not require notice in the Federal Register. Data on such sessions prior to 1990 are not available.

3 Appendix G contains a list of all FY 91 reports, plus abstracts of each.

a A full report on a topic is a more extensive discussion of the subject, e.g., greater than 10 pages. Separate data on full vs. letter reports are not available prior to 1990.

b A letter report is a more focused discussion of a topic. Included in this category are "commentaries" to the Administrator on issues of concern to the SAB.

c Includes three separate volumes of appendices to the *Reducing Risk* report.

TABLE IV SAB Expenses for Fiscal Years 1988-1991

Fiscal Year	Compensation			Travel Expenses	Other Expenses	TOTAL
	Staff	M/C	Total			
1988	\$550K	\$460	\$1,010K	\$280K	\$ 80K	\$1,370
1989	710	450	1,160	270	140	1,560
1990 ¹	750	390	1,140	210	320	1,680
1991	778	459	1,237	329	162	1,698

1 In FY 1990 there was considerable contract support for the development and production of *Reducing Risk* with consequent reduction in the need for SAB funds devoted to compensation and travel.

TABLE V SAB Activities by Committee for Fiscal Years 87-91

Committee	Fiscal Year	# Meetings ¹			# Reports ²			
		P.R.	Other	Total	Full	Ltr	Total	
EC	1987			4			0	
	1988			4			0	
	1989			4			0	
	1990	4	0	4	0	0	0	
	1991	4	1	5	0	0	0	
EC/ Ad hoc	1987			26			13	
	1988			26 ³			7	
	1989			20			3	
	1990	18	6	24 ⁴	7	0	7	
	1991	0	0	0	0	0	0	
CASAC	1987			6			7	
	1988			2			0	
	1989			0			6	
	1990	1	0	1	1	2	3	
	1991	1	0	1	2	0	2	
DWC	1990	4	0	4	3	2	5	
	1991	0	0	0	2	0	2	
EEC	1986			15			0	
	1987			7			4	
	1988			3			3	
	1989			11			3	
	1990	8	0	8	4	0	4	
1991	7	1	8	2	1	3		
EHC	1987			7			6	
	1988			9			19	
	1989			9			13	
	1990	3	0	3	3	0	3	
	1991	4	0	4	3	4	7	
EPEC	1987			5			1	
	1988			3			4	
	1989			7			3	
	1990	6	0	6	3	0	3	
	1991	10	0	10	4	0	4	
IAQC	1988			1			0	
	1989			2			1	
	1990	0	0	0	0	1	1	
	1991	2	0	2	1	0	1	
RAC	1987			3			3	
	1988			9			8	
	1989			2			3	
	1990	12	0	12	0	1	1	
1991	8	2	10	0	1	1		
REAC	1989			4			4	
	1990	2	0	2	3	0	3	
	1991	3	0	3	2	0	1	
Total		1991	47	4	51	16	6	22

where

EC Executive Committee
CASAC Clean Air Scientific Advisory Committee
DWC Drinking Water Committee
EEC Environmental Engineering Committee
EHC Environmental Health Committee
EPEC Ecological Processes and Effects Committee
IAQC Indoor Air Quality/Total Human Exposure Committee
RAC Radiation Advisory Committee
REAC Research Strategies Advisory Committee

¹ For FY 90 indicates meeting requiring notice in Fed. Reg. and those not req. notice.

² Entered as Full reports, or Letter reports (i.e., commentaries). Does not include 4 notifications of consultation (3 for EEC; 1 for EHC; and 1 for EPEC).

³ Includes meetings of the Research Strategies Committee

⁴ Includes 22 meetings of the Relative Risk Evaluation Strategies Committee (RRESC)

3.3.2 Criteria for activities

As the volume of requests for SAB involvement has increased, the Board has had to decide how to set its priorities. As a part of the "self-study" initiated in FY89, the Board's Mission and Functioning Committee developed a list of criteria which characterizes the more significant projects of the past and which can guide in the selection of projects in the future:

- a. Impact on overall environmental protection; e.g., the EMAP review (report in preparation), and the continuing activity implementing *Reducing Risk*

- b. Address novel scientific problems or principles; e.g., the Reference Concentration concept (SAB-EHC-91-008).
- c. Integrate science into Agency actions in new ways; e.g., the Ecoregion concept (SAB-EPEC-91-003)
- d. Influence long-term technological development; e.g., the EMAP research program (SAB-EPEC-91-001)
- e. Respond to emergencies (None in FY91)
- f. Deal with problems that transcend federal agency or other organizational boundaries; e.g., Environmental Tobacco Smoke (SAB-IAQC-91-007)
- g. Strengthen the Agency's basic capabilities; e.g., the review of the exposure assessment guidelines (report in preparation)
- h. Serve Congressional and other leadership interests; e.g., the review of the President's FY 92 budget proposal for EPA's research program (SAB-EC-91-005)

3.3.3 Impacts of activities

Each SAB activity has a unique set of consequences which can affect subsequent activity by the Agency, and, by extension, the rest of society. The listing below provides examples of some of these impacts were during FY 91.

a. Impacts on the rigor of the Agency's technical positions

For example, the SAB's FY 91 review of the relevance of kidney tumors in the male rat to human health risk assessment helped to move this strongly debated issue toward resolution.

b. Impacts on expenditures of funds

In FY 91 the SAB reviewed the proposed research programs in the areas of drinking water microbiology (SAB-DWC91-001), municipal solid waste (SAB-EC-91-009), ecological studies (SAB-EPEC-91-001, -003, -011, and -012), and the FY 92 R&D budget (SAB-EC-91-005). A significant percentage of the Agency's research dollars will be directed at these areas on a continuing basis for the next several years.

c. Impacts on emerging science policy

The SAB review of the Agency's assessment of formaldehyde addressed the key issue of dosimetric measures (the use of monkey DPX vs. traditional exposure indices) which could significance for the assessment of many other toxicants in the future (report in preparation).

d. Impacts on Agency planning

In FY 90 the SAB completed its study into comparative risks posed by environmental problems (*Reducing Risk*, SAB-EC-90-021, -021A, -021B, -021C). The Administrator used the report to launch a national debate on the issues and to set the framework for strategic planning and budgeting at EPA. Emphasis on orienting the Agency to this risk-based operating mode continues, with the establishment of two Agency task forces to work on implementation of specific SAB recommendations.

e. Impacts on the public debate of scientific and engineering issues

In FY 91 the SAB agreed to review the Agency's risk assessment of environmental tobacco smoke (ETS). The FY 91 meeting and consequent report (SAB-IAQC-91-007) attracted enormous public interest and comment. Although the report did not end the debate on this issue, it did provide a firm basis for progress towards a scientific consensus. The FY 91 review of EMF/Carcinogenicity issue was similarly the subject of wide-spread public interest, and the SAB's report (in preparation) is eagerly awaited.

3.3.4 Responses and reactions to SAB activities

Since 1984, the Board has formally requested written Agency responses to SAB reviews. The majority of the responses indicate that the Agency has acted positively on the advice given by the Board. In many instances, the Agency initiated action on the basis of the advice rendered at the public meetings, prior to receipt of the formal report from the Board. In some cases the Agency and the Board "agree to disagree".

Support for the SAB both inside and outside the Agency remains strong. The Administrator and Deputy Administrator have made it a practice to attend Executive Committee meetings to discuss topics of mutual interest. Several Assistant Administrators also made presentations and requests at meetings of the Executive Committee in FY 91. The greater number of EPA requests for SAB reviews speaks to the Agency's commitment to the SAB. However, resource

constraints continue to limit the extent to which the Board can respond fully to the needs of the Agency.

Outside the Agency, mention of the meetings and reports of the SAB appear in the trade press on a regular basis and in the public press on selected topics; e.g., environmental tobacco smoke, health risk assessment for perchlorethylene, and carcinogenicity of electromagnetic fields. SAB members, as recognized experts, are sought out by representatives of the media for comments on various environmental problems.

Congressional interest also continues. The ETS review drew close scrutiny from certain offices on Capitol Hill. In FY 91, for the first time, a Congressman asked to make a statement before an SAB committee (the RAC Subcommittee NIEMF). In addition, the House Subcommittee on Natural Resources, Agriculture Research and Environment, which oversees the EPA's research programs, regularly invites members of the SAB's ORD Budget Review Subcommittee to testify at its hearings. The Chair has commented favorably on the Board and on the utility of its report on the magnitude and distribution of the ORD budget. Also, the SAB is mentioned in recent legislation: the Superfund Amendments and Reauthorization Act (SARA) of 1986, the Safe Drinking Water Act Amendments (SDWAA) amendments of 1986, and the Clean Air Act amendments of 1990.

Extra-Agency support for the Board is heard in many segments of the community: environmental groups, industrial groups, and within state and local governments.

3.4 Examples of the SAB's Making Progress

3.4.1 Implementing *Reducing Risk*

The SAB report, *Reducing Risk*, was a major product of FY 90. The Board produced this document at the request of the Administrator, who was interested in the SAB's review and extension of the Agency's 1988 report, *Unfinished Business*, a study of the comparative risks posed by an array of environmental problems facing EPA, the Nation, and the world. At the end of last year, the SAB submitted its report to the Administrator. On the same day that he received it, Mr. Reilly featured the report in an address to the National Press Club, in which he called for a national debate on the issues raised by the Board; e.g., are our limited environmental protection resources being directed where they will do the most good? The Board advanced a total of 10 recommendations, and called on the country to do a better job of focusing its resources on those efforts which held the greatest potential for reducing risks to the public health and the environment.

In the year since its release, *Reducing Risk* has attracted much attention, both inside and outside the Agency. It has turned out to be a "best seller", with more than 20,000 copies in print, exceeding by a factor of three the demand for any previous SAB report. Administrator Reilly and Deputy Administrator Habicht have used the report repeatedly in speaking to various audiences. They have directed Agency personnel—at Headquarters and in the Regions—to use the report as a basis for formulating Agency policy, particularly its strategic plan and budget. In the process of implementing the recommendations of the report, each of the Regions has conducted its own "comparative risk" project. In addition, the Agency has established two task forces to pursue two major suggestions in the report. The first effort focuses on the issue of habitats, the loss of which were identified by the SAB as a major environmental problem. The second effort addresses the SAB-described need to improve the data base upon which comparative risk decisions have to be based. The Board continues to be involved in these efforts, planning publicly announced "consultations"—basically, a collegial discussion of options the Agency might take in approaching a complex issue—on these subjects.

In January, Mr. Reilly and Dr. Loehr were the only two witnesses at a Congressional hearing, conducted by Senator Moynihan of New York. Each of the eight Senators participating in the 2-hour discussion expressed support for the concepts in the report, although some of the Congressmen were skeptical about our ability to carry them out. SAB members and Staff have discussed the report in a wide array of forums, including the National Research Council, various government agencies, and numerous professional organizations. This activity was capped by a day-long symposium at the August meeting of the American Chemical Society in which SAB members participated in an exploration of the topic: "What is needed to do a better job of comparing risks posed by competing environmental problems?" The results of that symposium will be published.

3.4.2 Risk-based Strategy for Wetlands Research

The alteration and loss of critical habitats was given a high priority in the SAB report on *Reducing Risk*. No habitat was more controversial and contested in 1991 than the delineation and protection of wetland habitats. The SAB was involved in this issue through an unusual combination of professions—engineers and ecologists.

Specifically, in FY91 two Committees of the SAB, the Ecological Processes and Effects Committee (EPEC) and the Environmental Engineering Committee (EEC), combined their talents and varied disciplinary approaches to conduct two reviews of wetlands research. First, an EPEC subcommittee led a review of the draft FY 1992-1996 Research Plan *Wetlands Research: An Integrated Risk-Based Research Strategy*. The Wetlands Research Subcommittee included ecologists, a

microbiologist, engineers, hydrologists, and botanists as well as prominent researchers from the U.S. Forest Service, Soil Conservation Service, Fish and Wildlife Service and the Corps of Engineers. The Subcommittee found that the Agency had made significant progress in applying a risk-based approach for managing wetlands and provided substantive recommendations to help continue that trend.

The EEC subcommittee led the second review of research on constructed wetlands for wastewater treatment. The Subcommittee included three of the federal scientists and several of the EPEC subcommittee members. The Subcommittee found that the research program was a modest effort, but recommended that additional work should be undertaken on constructed wetlands for mitigation of wetlands losses. The collaboration of engineers and ecologists led to an increase in the SAB's ability to provide more comprehensive recommendations to the Agency, integrating engineering and ecological research.

The SAB found that the Wetlands Research Program made significant contributions to the delineation of wetland boundaries. It also serves as a model research program for implementing SAB recommendations for setting priorities aimed at reducing the greatest environmental risks. In addition, because the Wetlands Program focuses on a resource which is multimedia, the problems of restoring wetlands and defining their functions are amenable to a risk-based approach. The review of the Wetlands Research Program thus provided the Board with an opportunity to examine, perhaps for the first time, the impact of the *Reducing Risk* orientation on research planning.

3.4.3 Electromagnetic Fields and Cancer

In 1990 the Agency released *Evaluation of the Potential Carcinogenicity of Electromagnetic Fields* and in 1991 *A Research Strategy for Electric and Magnetic Fields: Research Needs and Priorities*. The former document provided a focus for both public and scientific controversies concerning the safety of transmission lines and electrical appliances of various sorts. Paul Brodeur's book, *Currents of Death* sets forth typical public concerns; a series of three *Science* articles in the fall of 1990 (now available as reprints) captures some of the debate in the scientific community. In contrast, by the time the latter document was released there was widespread support in the research community for a program in this area.

In January 1990, the Agency, anticipating the release of these reports, asked the Radiation Advisory Committee to critically review these documents. In May 1990, the Committee established a specialized Subcommittee--the Nonionizing Electric and Magnetic Fields Subcommittee (NIEMFS). Considerable effort and care went into the structure of the Subcommittee. Staff and Board members

consulted with dozens of individuals and organizations and considered almost 300 scientists before seventeen were selected. The Subcommittee held three meetings notable for the exceptional public interest. Over 200 members of the public attended the first of these meetings and there were roughly 20 oral statements, including presentations by the mayor of an eastern city, a Congressman, and citizens from foreign countries. The NIEMFS approved its report on the carcinogenicity review at a July 1991 public meeting and expects to approve the research agenda review later in the fall of 1991.

The Subcommittee found that *Evaluation of the Potential Carcinogenicity of Electromagnetic Fields* had serious deficiencies in regard to the accuracy and completeness of the information provided as well as in the interpretation of the scientific data. The Subcommittee concluded that there is insufficient evidence from the human epidemiology data and from animal/cell experiments to establish the cause-and-effect relationships between low-frequency electric and magnetic field exposure and human health effects and cancer and the precise nature of the environmental low frequency electric and magnetic field potentially related to human disease remains to be elucidated.

4. REVIEW OF FY91 ACTIVITIES

4.1 Introduction

Like last year, FY 91 was a busy and varied year for the Science Advisory Board. The number of meetings held and the number of issues addressed during the year continued at a high level. The Board again examined several new topics whose ramifications for Agency planning, policy and practice are far-reaching. The SAB Staff maintained its commitment to quality service to the Board, the Agency, and the public while undertaking various actions to assess and enhance its own institutional health.

This section of the FY 91 Annual Report consists of a brief overview of SAB Committee activities, a presentation of the ways in which the SAB is "making progress," and staff changes in the Science Advisory Board Office. Additional details and summaries are found in the appendices.

4.2 Overview of SAB Activities

In FY91, the various Committees and Subcommittees of the SAB conducted over 50 meetings, including formal public meetings, writing sessions, conference calls, and the Second Annual Meeting of the Science Advisory Board, held in October 1991. The Board issued 16 separate full reports and 6 letter reports. Some of these reports reflected reviews conducted in the previous fiscal year; just as some FY 91 reviews will result in FY 92 reports. The SAB was involved in some way with nearly every program office of the Agency. As a result, the Board affected the Agency very broadly. The SAB both responded to requests for reviews from the Agency and took the initiative in delving into new areas and new approaches to providing the kind of scientific and engineering advice that makes a difference in the Agency's operations.

These activities are summarized by Committee in the sections below. Appendix F contains a list of all the meetings, arranged by Committee, and Appendix G contains a list of all the SAB reports, including abstracts, issued during the year.

4.2.1 Executive Committee (EC)

As is its normal practice, the EC met four times during FY 91 to conduct its business of overseeing activities of the Board and reviewing Committee reports for transmittal to the Administrator. (The separately chartered CASAC submits its reports directly to the Administrator, with information copies being supplied to the EC.) The EC also hosted an Annual Meeting of the entire membership in

conjunction with its first meeting of the year. During this year, the EC has continued to take a much larger role in the planning and prioritizing of the Board's activities and in the review of its Committee-prepared reports. This has helped to provide consistency in SAB products, and worked toward broadening the Board's activities. In addition, for the first time, the EC conducted a consultation in conjunction with one of its meetings. The topic was the Agency's efforts to update its 1986 Cancer Risk Assessment Guidelines.

4.2.2 Clean Air Scientific Advisory Committee (CASAC)

CASAC primarily reviews documents relating to National Ambient Air Quality Standards (NAAQS). By law, these standards are to be re-evaluated by EPA every 5 years; in practice however, the process often takes longer. Under the provisions of the Clean Air Act Amendments, CASAC must provide advice to the Administrator regarding such re-evaluations. However, CASAC does not set the review schedule; rather, its reviews are normally responsive to Agency time tables. During FY91, the CASAC held one meeting which addressed the Carbon Monoxide Criteria Document.

Two reports were released in FY 91:

- a. Air Quality Criteria for Carbon Monoxide (SAB-CASAC-91-015)
- b. Research Plan for the Effects of Tropospheric Ozone on Forest Trees (SAB-CASAC-91-010)

4.2.3 Drinking Water Committee (DWC)

The DWC held five full Committee meetings and three conference calls during the year. They addressed the following issues:

- a. Arsenic Research Plan (Report in preperation)
- b. Chlorinated Acids (Report in preperation)
- c. Colilert (Microbiological Protocols) (SAB-DWC-91-014)
- d. Corrosion Research (Report in preperation)
- e. Cyanogen Chloride (Report in preperation)
- f. Trihalomethanes Criteria Document (Report in preperation)

Operations of this Committee were slowed in the latter part of FY91 due to significant staff changes. Dr. William Glaze, the Chair, resigned due to the press of other responsibilities, having forcefully and successfully led the Committee during the past two years. Dr. C. Richard Cothorn, the DFO, left on a 4-month rotational assignment to another EPA office during the latter part of the year. Ms. Darlene Sewell, the Staff Secretary to the DWC was promoted to Secretary to

the Staff Director, following the successful delivery of a baby girl. The Committee now has a new Chair for FY92 (Dr. Verne Ray), an acting DFO (Mr. Robert Flaak), and a new Staff Secretary (Ms. Frances Dolby)—as well as a burgeoning agenda for FY92.

4.2.4 Ecological Processes and Effects Committee (EPEC)

EPEC held nine Committee meetings and Subcommittee meetings this year. The Committee reviewed topics from several different sources and conducted a consultation with one program that included presentations from EPA regional offices and states. In July 1991, EPEC and EEC sponsored two reviews of Wetlands research which are discussed further in section 3.4.2. The following issues were addressed during this year:

- a. Ecological Indicators for the Environmental Monitoring and Assessment Program (EMAP) (SAB-EPEC-91-001)
- b. Evaluation of the Ecoregion Concept (SAB-EPEC-91-003)
- c. Evaluation of the Program Plan for EMAP (SAB-EPEC-91-011)
- d. Evaluation of the Proposed Center for Marine and Estuarine Disease Research (SAB-EPEC-91-012)
- e. EPA's Ecorisk Assessment Research Program (Report in preparation)
- f. EPA's Research on Expert Systems to Predict the Fate and Effects of Chemicals (Report in preparation)
- g. EPA's Research on Wetlands (Report in preparation)
- h. National Estuary Program Monitoring Guidance (Report in preparation)
- i. A consultation on biological criteria for water quality.
(SAB-EPEC-91-CON-004)

4.2.5 Environmental Engineering Committee (EEC)

The EEC conducted three planning and coordination meetings of the full Committee and five meetings of various subcommittees. Three teleconferences were held through the year by the EEC and its Subcommittees. Additional special events included

- a. Congressional Testimony by Dr. Francis McMichael, Chair of the EEC's Municipal Solid Waste Subcommittee on Municipal Solid Waste Research before the Subcommittee on Environment of the Committee on Science, Space and Technology of the U.S. House of Representatives, June 20, 1991. Dr. McMichael's testimony was helpful to the Subcommittee in deciding what revisions, based on "sound science"

may be needed in amendments to the MSW components of the Resource Conservation and Recovery Act (RCRA).

- b. A Pollution Prevention Subcommittee editing teleconference
- c. A joint review with the EPEC on Wetlands issues
- d. An investigation into the relationships between the SAB and OSWER, with recommendations for improvements and future projects (authored by Mr. Norman Neidergang of Region 5)

The following topics were addressed during the year:

- a. Review of ORD's Proposed Project, entitled "Potential Hazards of Municipal Waste Recycling." (SAB-EEC-91-LTR-005)
- b. Consultation on the Review of Selection Criteria for Participation of EPA Staff on the Proposed Agency Task Force on Modeling. (SAB-EEC-91-CON-002)
- c. Review of the ORD's Municipal Solid Waste Research Program. (SAB-EEC-91-009)
- e. Consultation with EPA/OSW and EMSL-Las Vegas Staff on Review of Quantitative Data Quality Objectives for Ground-Water Monitoring. (SAB-EEC-91-CON-003)
- f. Review of OSWER's Draft Report on the Usage of Computer Models in the Hazardous Waste/Superfund Programs and Proposed Pilot Study. (Report in preparation)
- g. Review of Constructed Wetlands Research. This was the very successful tandem review of wetlands issues, which was conducted on July 16 through 18, 1991 at the EPA Corvallis Laboratory with the EPEC's Wetlands Research Subcommittee and the EEC's Constructed Wetlands Subcommittee. (Report in preparation)

4.2.6 Environmental Health Committee (EHC)

The EHC conducted four full Committee meetings during FY 91. The following issues were addressed:

- a. Chemical Mixtures Exposure (Report in preparation)
- b. Chemical Mixtures Health Research Strategy (Report in preparation)
- c. Formaldehyde Consultation (SAB-EHC-91-CON-001)
- d. Formaldehyde Risk Assessment (report in preparation)
- e. Perchloroethylene (SAB-EHC-91-013)
- f. Rat Kidney Tumors (SAB-EHC-91-LTR-006)
- g. RfC Inhalation Toxicology (SAB-EHC-91-008)

A number of FY 91 reports reflect issues examined in FY 90:

- a. Assessment of Occupational Exposure Limits for Reference Concentrations (SAB-EHC-91-LTR-004)
- b. Drinking Water Criteria for Nickel (SAB-EHC-LTR-91-002)
- c. RfD for Essential Metals in Drinking Water (SAB-EHC-LTR-91-003)
- d. Pentachlorophenol (SAB-EHC-91-002)

Three of the FY 91 issues--perchloroethylene (perc), formaldehyde, and the rat kidney tumors--generated considerable public interest, and elicited major participation by the public. Several public interest groups, industry associations, and individual members of the public provided articles, reference materials, and oral comments before, and during the meetings, particularly in reference to perc and formaldehyde, substances in widespread use in industry and trade. Also, in the case of formaldehyde, interest was high in the scientific community because of the Agency's interest in utilizing a novel approach (DNA protein cross-linking (DPX)) as a measure of absorbed dose.

4.2.7 Indoor Air Quality/Total Human Exposure Committee (IAQC)

The Committee held two meetings this year, addressing the following issues:

- a. Environmental Tobacco Smoke Risk Assessment and Policy Guide (SAB-IAQC-91-007)
- b. Exposure Assessment Guidelines (Report in preperation)

One of the most visible issues the Board has undertaken in many years, the ETS review provided a broad platform for the SAB to provide its advice. Congress, lobbyists, all forms of media including television, radio, newspapers and various periodicals, and the public all were involved in the public process.

4.2.8 Radiation Advisory Committee (RAC)

During FY91 the RAC conducted seven public Committee and Subcommittee meetings, and three writing sessions, two of which were conducted by conference call. The following topics were addressed at these meetings:

- a. Closure/Commentary letter on the proposed regulation for radionuclides in drinking water and supporting documentation. (Report in preperation)
- b. Commentary on residual radioactivity and contaminated sites. (Report in preperation)
- c. Commentary on transport models for radionuclides in the environment. (Report in preperation)

- d. Correlation of short-term and long-term tests for radon. (Report in preperation)
- e. Design of the national radon survey. (Report in preperation)
- f. Radon risks to smokers, non-smokers, and children. (SAB-RAC-91-LTR-001)
- g. Revised radon risk estimates (Report in preperation)
- h. Review of *A Research Strategy for Electric and Magnetic Fields: Research Needs and Priorities*. (Report in preperation)
- i. Review of the August, 1991 draft revised *Citizen's Guide to Radon*. (Report in preperation)
- j. Review of the *Evaluation of the Potential Carcinogenicity of Electromagnetic Fields*. (Report in preperation)
- k. Review of the *Idaho Radionuclide Study* (Report in preperation)
- l. 1990 Draft Drinking Water Criteria Documents for gross beta, radon, radium and uranium. (Report in preperation)

4.2.9 Research Strategies Advisory Committee (RSAC)

During FY91, the RSAC held three Committee and Subcommittee meetings. The issues addressed were:

- a. New Approaches to Research Planning. (Report in preperation)
- b. ORD Budget Review. (SAB-EC-91-005)
- c. Scientific and Technical Achievement Awards (STAA). (SAB-RSAC-91-006)

The ORD Budget Review and the STAA review are both annual events for the SAB. The former has been routinely requested by Congress for the past several years. The latter is an opportunity to review the fine technical work being done by EPA scientists and engineers and to make recommendations for professional recognition and cash awards from ORD.

4.2.10 Other Committees

a. Environmental Economics Advisory Committee (EEAC)

This Committee was created during FY 91 at the request from the Administrator who was responding to a recommendation in the Board's *Reducing Risk* report. The Committee's mission will include reviewing the quality and relevance of particular economic analyses (e.g., analyses underpinning the National Ambient Air Quality Standards); reviewing generic regulatory economic approaches (e.g., methods for estimating full costs and benefits of EPA regulations and policies); reviewing research programs (e.g., alternative approaches to valuing ecological

assets and investigations of the creative use of market incentives); reviewing the economic bases of various applied programs (e.g., the economics of pollution prevention programs); advising on infrastructure and technical management issues (e.g., the organization and integration of economic assets in the Agency); advising on emergency and other short-notice problems; and advising on broad strategic matters (e.g., approaches to incorporating non-monetary considerations into cost/benefit valuation, and approaches to evaluating environmental costs and benefits of alternative policies and practices in areas such as energy, transportation, agriculture, and climate change).

Two eminent Co-Chairs were selected. The final selection of Committee members will be made in early FY 92.

b. Clean Air Compliance Advisory Council (CACAC)

This statutory advisory group (See Clean Air Act Amendments of 1990) is being formed under the administrative umbrella of the SAB. Like CASAC, it will report directly to the Administrator. A separate charter is being prepared. The Council and the EEAC will have complementary responsibilities and some overlap in membership.

4.3 Making Progress in the SAB Staff Office

During FY 89 the SAB was subject to internal and external studies--through a self-study by Board members and through a management analysis of the operation of the Staff Office by EPA management experts. These two studies were formally presented to the SAB in early FY 90. During that year, the SAB Staff followed-up on many of the recommendations of the two groups. The FY 90 SAB Director's Report summarized the important recommendations and progress to date. In sum, the reports urged the Board and the Staff Office to "work smarter" to achieve the goals of the SAB. The Staff believes that they have now met that challenge, and are now seeing the results of that effort. This portion of the Annual Report is devoted to examining these and other evidences that the Board is, in fact, making progress.

4.3.1 Computer Systems

In previous reports, we have discussed our plans for modernization through computerization. During this year we have added a local area network (LAN), connecting the Fairchild Staff Office and the Director's Office (we are about 8 blocks apart). The system is also connected to the main EPA "backbone" system, providing us with access to all the other LAN's within the Agency. The LAN gives us the capability to share files, transfer information without physically

traveling to each other's offices, and it exchanges internal electronic message traffic. The LAN is not yet fully operational as we go to press (It was brought on line in late September 1991 and actually became functional in early October 1991). We have also added a full-page scanner capability and a Macintosh graphics workstation, and have purchased two laptop computers. The laptops have already proved their worth in providing useful document retrieval/information capture support at on-site at meetings. In FY 92 we will purchase optical character reading (OCR) software. This year we also added another FAX machine to our inventory. The combination of high quality fax copy and the scanner with OCR software will allow us to convert faxed reports into computer files without retyping them. We are also exploring the use of electronic voice mail and bulletin board systems to provide better service to our members and consultants and to the public.

4.3.2 Total Quality Management (TQM)

Like the rest of EPA, the SAB is embarking on a journey of self-improvement through quality enhancements. We are in the early stages of this process and plan to have the entire staff trained in the techniques of TQM in FY 92.

4.3.3 Staff Retreat

In the summer of 1991, the entire SAB Staff traveled to Williamsburg, Virginia and spent three days discussing what we do and how to do it better. In a sense, this is part of our TQM activities. The Retreat resulted in a 20 page report that included about two dozen specific projects which will be pursued by Staff in the coming year. All who attended agreed that the idea was so good that we plan on doing it again next year. At a follow-up meeting in November 1991 the staff discussed action plans designed to solve some of the identified problems.

4.3.4 Rotational Opportunities

In the past few years individuals have joined the Staff on a rotational basis from other EPA staff offices. SAB Staff have also gone to other offices on rotational assignments. In most cases, these temporary arrangements have become permanent. The idea has become so popular that only space restrictions limit the number of additional rotational slots available. This is an exciting and active program at the SAB which will continue.

4.3.5 Personnel Changes

FY 91 has been a year of major personnel changes on the Staff. The Staff Director's position was elevated to the Senior Executive Service, an Assistant Staff

Director's position was created to manage the Fairchild Staff Office, and a Program Assistant position was created to coordinate support services. Other changes included promoting a Staff Secretary to the position of Staff Director's Secretary, adding a contract employee as Receptionist, preparing to hire a full time personnel clerk, hiring two more Staff Secretaries, and changing the primary Committee assignments of three of the Staff Secretaries.

4.3.6 Administrative/Operational changes

In the Staff Office, we are preparing standard procedures for many of our activities, setting-up document control procedures, creating mailing systems, producing an informational brochure on the SAB, training all staff on administrative and computer systems, and preparing a standard format for SAB reports and other advisory documents.

4.4 SAB Staff in Transition

This year, the SAB Staff began the year with vacancies on the Support Staff. This is not an uncommon problem due to the heavy workload and limited opportunities for prolonged breaks from the regular meeting schedules. At the Fairchild Staff Office, wide-ranging personnel shifts were planned and implemented to allow diversity of experience and to change working assignments, allowing a wider range of internal staff interactions. These changes were designed to foster increased personnel interdependence and to encourage more diverse interaction between SAB Staff and the Committees.

Dr. Donald Barnes was promoted to the Agency's Senior Executive Service (SES). Elevating the Staff Director's position to the Senior Executive Service (SES) was one of the recommendations of the Management and Organization Report to improve the overall management structure of the SAB Staff Offices. This step recognizes the importance of the SAB Staff office by placing its Staff Director at a level commensurate with other senior Agency officials.

Mr. Randy Bond joined the SAB Staff on a rotational assignment from the Office of Health Research. His technical expertise and administrative knowledge have made him a very important member of the staff. As of the close of the fiscal year, Randy has agreed to remain with us permanently where he will serve as the DFO for both CASAC and RSAC.

Ms. LaShae Cardenas is a new Stay-in-School serving in the Director's Office, and attending Bowie State College.

Dr. Rick Cothorn has served as the DFO for the Drinking Water Committee for the past several years. He left during the spring on a rotational assignment to provide staff assistance to the Agency's new initiative in environmental statistics. As is often the case with rotational assignments, Rick has found a new home which provides him with new challenges and opportunities.

Ms. Frances Dolby who previously served as Staff Secretary for the EPEC, assisting the EPEC DFO Ed Bender support the SAB's ecological review efforts, now serves Staff as Secretary to the DWC, assisting the Acting DWC DFO, Bob Flaak.

Mr. Robert Flaak became the Assistant Staff Director in February, 1991, after serving as Acting Assistant Staff Director for over a year. He also served as the DFO for both CASAC and the IAQC. Bob supervises the Fairchild SAB Staff and oversees the SAB process from the first meeting on an issue until the final report. From January through May 1991, Bob served in the Persian Gulf War when his Army Reserve Unit was activated. During his absence, Mr. Samuel Rondberg filled as Acting Assistant Staff Director. Since his return from Saudi Arabia, Kuwait and Iraq, Bob has turned over his CASAC DFO responsibilities to Randy Bond, focusing his efforts on the management of the Staff and continuing his role as DFO for the IAQC. Bob also serves as the Acting DFO for the Drinking Water Committee, until a permanent DFO is hired.

Ms. Sarita Hicks left the Staff in July 1991, after serving as receptionist at the Fairchild Building.

Ms. Marcia (Marcy) Jolly who previously served as Staff Secretary for the EEC, assisting the EEC DFO Jack Kooyoomjian in support of the SAB's engineering review efforts, now serves as Staff Secretary to the EPEC, assisting the EPEC DFO, Ed Bender, on ecological review issues. Marcy made this switch in July 1991.

Mr. Norman Neidergang, Associate Division Director, Office of Superfund in EPA Region V spent part of the summer in a career developmental assignment with the SAB to prepare an evaluation of the SAB's involvement with the Superfund Program and to identify areas for greater SAB involvement in the future. He identified 17 potential areas of SAB/Superfund interaction which he presented to the Board.

Ms. Carolyn Osborne was promoted to Program Assistant. In this role she serves as the primary focal point for coordination and liaison within the Fairchild Staff Office. She provides guidance and training to the Staff Secretaries and

supervises the other members of the Support Staff. She also serves as the principal assistant to the Assistant Staff Director.

Ms. Diana Pozur joined the SAB Fairchild Staff in July 1991 as the new EEC Staff Secretary, filling Marcy Jolly's former position with the EEC. Diana has served for many years in the private sector as an Executive Secretary and brings many critical skills to her new position.

Ms. Darlene Sewell was promoted to the position of Secretary to the Staff Director. She previously served as the Staff Secretary to the Drinking Water Committee. She replaces Ms. Joanna Foellmer who was promoted to Project Coordinator in FY 90.

Ms. Barbara Spencer-Pulliam has joined the SAB Fairchild Office Staff as Receptionist. Barbara is a retired school teacher who comes to us through the American Association of Retired Persons (AARP) program that places retired individuals in contract-supported positions. Ms. Spencer-Pulliam works full-time and is usually the first voice the public hears when they call the SAB at the Fairchild Staff Office.

5. CONCLUSIONS AND PROJECTIONS

The SAB is entering a new era of activity and involvement in the Agency. It is clear that the Board is now taking a more proactive stance in its advisory role. Both the current Administrator, Bill Reilly, and the Deputy Administrator, Hank Habicht, are supporting this effort to find new ways to bring outside expertise to bear on a wider variety of scientific and engineering issues facing the Agency.

During FY 91 the SAB Staff will be working with the Agency and the Board to involve both institutions in the setting of priorities for the SAB. Current resources do not permit the Board's examining all of the issues which could be profitably addressed. The Agency is simply involved in too many substantive issues. Therefore, there is a need to set priorities, a process which should involve a wide range of people and ideas. Through an invigorated Executive Committee, a more active SAB Consultative Group, and more dynamic relationships with program office staff, the SAB Staff will more clearly identify and describe the possible projects that could be brought to the Board. They will work with various SAB Committees to select those issues that are the most pertinent and promising, based on the specific criteria previously established by the Mission and Functioning Committee.

FY 92 will find the Board and the SAB Staff will moving ahead at a more rapid pace, taking on greater responsibilities and providing the Agency and the public with focused and timely scientific advice to help protect human health and the environment.

APPENDIX A

CURRENT CHARTERS OF THE SCIENCE ADVISORY BOARD AND THE CLEAN AIR SCIENTIFIC ADVISORY COMMITTEE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

ADVISORY COMMITTEE CHARTER

ORGANIZATION AND FUNCTIONS-COMMITTEES, BOARDS, PANELS, & COUNCILS

SCIENCE ADVISORY BOARD

1. PURPOSE AND AUTHORITY. This Charter is reissued to renew the Science Advisory Board in accordance with the requirements of the Federal Advisory Committee Act, 5 U.S.C. App. 9 (c). The former Science Advisory Board, administratively established by the Administrator of EPA on January 11, 1974, was terminated in 1978 when the Congress created the statutorily mandated Science Advisory Board by the Environmental Research, Development, and Demonstration Authorization Act (ERDDAA) of 1978, 42 U.S.C. 4365. The Science Advisory Board charter was renewed October 31, 1979; November 19, 1981; November 3, 1983; October 25, 1985; November 6, 1987; and November 8, 1989.

2. SCOPE OF ACTIVITY. The activities of the Board will include analyzing problems, conducting meetings, presenting findings, making recommendations, and other activities necessary for the attainment of the Board's objectives. Ad hoc panels may be established to carry out these special activities in which consultants of special expertise may be used who are not members of the Board.

3. OBJECTIVES AND RESPONSIBILITIES. The objective of the Board is to provide independent advice to EPA's Administrator on the scientific and technical aspects of environmental problems and issues. While the Board reports to the Administrator, it may also be requested to provide advice to the U. S. Senate Committee on Environment and Public Works or the U. S. House Committees on Science and Technology, Energy and Commerce, or Public Works and Transportation. The Board will review scientific issues, provide independent scientific and technical advice on EPA's major programs, and perform special assignments as requested by Agency officials and as required by the Environmental Research, Development, and Demonstration Authorization Act of 1978 and the Clean Air Act Amendments of 1977. Responsibilities include the following:

- Reviewing and advising on the adequacy and scientific basis of any proposed criteria document, standard, limitation, or regulation under the Clean Air Act, the Federal Water Pollution Control Act, the Resource Conservation and Recovery Act, the Noise Control Act, the Toxic Substances Control Act, the Safe Drinking Water Act, the Comprehensive Environmental Response, Compensation, and Liability Act, or any other authority of the Administrator;

- Reviewing and advising on the scientific and technical adequacy of Agency programs, guidelines, methodologies, protocols, and tests;
- Recommending, as appropriate, new or revised scientific criteria or standards for protection of human health and the environment;
- Through the Clean Air Scientific Advisory Committee, providing the technical review and advice required under the Clean Air Act, as amended in 1990;
- Reviewing and advising on new information needs and the quality of Agency plans and programs for research, development and demonstration.
- Advising on the relative importance of various natural and anthropogenic pollution sources;
- As appropriate, consulting and coordinating with the Scientific Advisory Panel established by the Administrator pursuant to section 21 (b) of the Federal Insecticide, Fungicide and Rodenticide Act, as amended; and
- Consulting and coordinating with other Agency advisory groups, as requested by the Administrator.

4. COMPOSITION. The Board will consist of a body of independent scientists and engineers of sufficient size and diversity to provide the range of expertise required to assess the scientific and technical aspects of environmental issues. The Board will be organized into an executive committee and several specialized committees, all members of which shall be drawn from the Board.

The Board is authorized to constitute such specialized committees and ad hoc investigative panels and subcommittees as the Administrator and the Board find necessary to carry out its responsibilities. The Administrator will review the need for such specialized committees and investigative panels at least once a year to decide which should be continued. These committees and panels will report through the Executive Committee.

The Administrator also shall appoint a Clean Air Scientific Advisory Committee of the Board to provide the scientific review and advice required by the Clean Air Act Amendments of 1990. This group, established by separate charter, will be an integral part of the Board, and its members will also be members of the Science Advisory Board.

5. MEMBERSHIP AND MEETINGS. The Administrator appoints individuals to serve on the Science Advisory Board for two year terms and appoints from the membership a Chair of the Board. The Chair of the Board serves as Chair of the Executive Committee.

Chairs of standing committees or ad hoc specialized subcommittees serve as members of the Executive Committee during the life of the specialized subcommittee. Each member of the Board shall be qualified by education, training, and experience to evaluate scientific and technical information on matters referred to the Board. No member of the Board shall be a full-time employee of the Federal Government. Most members will serve as special Government employees.

There will be approximately 50-60 meetings of the specialized committees per year. A full-time salaried officer or employee of the Agency will be present at all meetings and is authorized to adjourn any such meeting whenever this official determines it to be in the public interest.

Support for the Board's activities will be provided by the Office of the Administrator, EPA. The estimated total annual operating cost will be approximately \$1,689.0 and the estimated Federal permanent staff support will be 14.6 workyears.

6. DURATION. The Board shall be needed on a continuing basis. This charter will be effective until November 8, 1993, at which time the Board charter may be renewed for another two-year period.

7. SUPERSESSSION. The former charter for the Science Advisory Board, signed by the Deputy Administrator on November 8, 1989 is hereby superseded.

OCT 04 1991

Approval Date
NOV - 8 1991


Deputy Administrator

Date Filed with Congress

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

ADVISORY COMMITTEE CHARTER

ORGANIZATION AND FUNCTIONS-COMMITTEES, BOARDS, PANELS AND COUNCILS

Clean Air Scientific Advisory Committee **of the Science Advisory Board**

1. **Purpose:** This charter is reissued to renew the Clean Air Scientific Advisory Committee of the Science Advisory Board in accordance with the requirements of section 9(c) of the Federal Advisory Committee Act, 5 U.S.C. App. I sec. 9(c).
2. **Authority:** The Committee is authorized under section 109 of the Clean Air Act, as amended [ACT], (42 U.S.C. 7409), and the charter was renewed on August 6, 1979; July 22, 1981; August 1, 1983; July 23, 1985; August 5, 1987; and August 7, 1989.
3. **Objective and Scope of Activity:** The Committee shall provide independent advice on the scientific and technical aspects of issues related to the criteria for air quality standards, research related to air quality, source of air pollution, and the strategies to attain and maintain air quality standards and to prevent significant deterioration of air quality. The Committee shall hold meetings, perform studies, make necessary site visits, and undertake other activities necessary to meet its responsibilities. The Committee will coordinate its activities with other Committees of the Science Advisory Board and may, as it deems appropriate, utilize the expertise of other committees and members of the Science Advisory Board. Establishment of subcommittees is authorized for any purpose consistent with this charter. The Committee will report to the Administrator of the U.S. Environmental Protection Agency.
4. **Functions:** The Committee will review criteria documents for air quality standards and will provide independent scientific advice in response to the Agency's request and, as required by section 109 of the Act shall:
 - Not later than January 1, 1980, and at five year intervals thereafter, complete a review of the criteria published under section 108 of the Clean Air Act and the national primary and secondary ambient air quality standards and recommend to the Administrator any new national ambient air quality standards or revision of existing criteria and standards as may be appropriate.

ADVISORY COMMITTEE CHARTER

- Advise the Administrator of areas where additional knowledge is required concerning the adequacy and basis of existing, new, or revised national ambient air quality standards,
- Describe the research efforts necessary to provide the required information,
- Advise the Administrator on the relative contribution to air pollution concentrations of natural as well as anthropogenic activity, and
- Advise the Administrator of any adverse public health, welfare, social, economic, or energy effects which may result from various strategies for attainment and maintenance of such national ambient air quality standards.

5. Composition and Meetings: The Administrator will appoint a Chairperson and six members including at least one member of the National Academy of Sciences, one physician, and one person representing State air pollution control agencies for terms up to four years. Members shall be persons who have demonstrated high levels of competence, knowledge, and expertise in the scientific/technical fields relevant to air pollution and air quality issues. Members of the Committee become members of the Science Advisory Board, and the Chairperson of the Committee, or his designee, shall serve as a member of the Executive Committee of the Science Advisory Board. The Committee will meet three to six times per year. A full time salaried officer or employee of the Agency will be present at all meetings and is authorized to adjourn any such meeting whenever this official determines it to be in the public interest. Support shall be provided by EPA through the Offices of the Science Advisory Board. The estimated annual operating cost totals approximately \$185,000 and two workyears of staff support.

6. Duration: The Committee will be needed on a continuing basis. This charter will be effective until August 7, 1993, at which time the Committee charter may be renewed for another two-year period.

AUG 7 1991

Approval Date

AUG - 7 1991

Date Filed with Congress



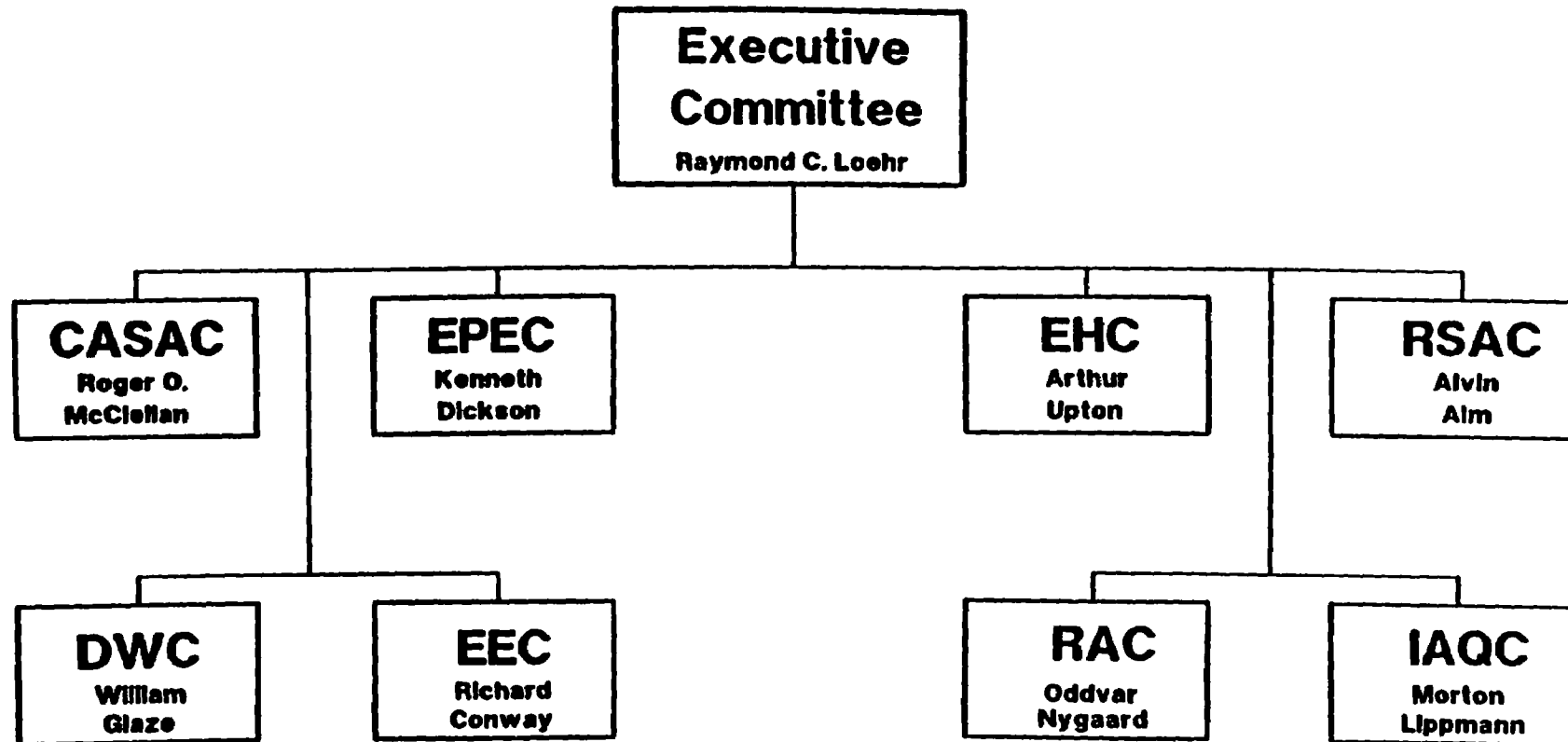
Deputy Administrator

APPENDIX B

**ORGANIZATIONAL CHART OF THE SCIENCE ADVISORY BOARD
IN FY91**

SCIENCE ADVISORY BOARD

Committee Structure



Clean Air Scientific Advisory Committee (CASAC)
Ecological Processes and Effects Committee (EPEC)
Drinking Water Committee (DWC)
Environmental Engineering Committee (EEC)

Environmental Health Committee (EHC)
Research Strategies Advisory Comm. (RSAC)
Radiation Advisory Committee (RAC)
Indoor Air Quality/Total Human Exposure Committee (IAQC)

APPENDIX C

STAFF SUPPORT AND COMMITTEE LEADERSHIP IN FY 91

Many of the following positions were filled by two people during the year as changes in personnel or staff alignments were made. Where two persons occupied a position during the year, both are listed. The latter name is the incumbent at the close of FY 91.

Staff Director's Office

Staff Director:	Dr. Donald G. Barnes
Project Coordinator:	Ms. Joanna Foellmer
Secretary to the Staff Director:	Ms. Darlene Sewell
Clerk Typist:	Ms. Lori Gross
Stay-in-School	Ms. LaShae Cardenas

Executive Committee

Chair:	Dr. Raymond C. Loehr
Designated Federal Official:	Dr. Donald G. Barnes
Staff Secretary:	Ms. Darlene Sewell

Fairchild Staff Office

Assistant Staff Director:	Mr. A. Robert Flaak
Program Assistant:	Ms. Carolyn Osborne
Receptionist:	Mrs. Barbara Spencer-Pulliam
Stay-in-School:	Ms. Kahlil Posey

Clean Air Scientific Advisory Committee

Chair:	Dr. Roger McClellan
Designated Federal Official:	Mr. Robert Flaak/Mr. Randy Bond
Staff Secretary:	Ms. Carolyn Osborne

Drinking Water Committee

Chair:	Dr. William Glaze/Dr. Verne Ray
Designated Federal Official:	Dr. Richard Cothorn/Mr. Robert Flaak
Staff Secretary:	Ms. Darlene Sewell/Ms. Frances Dolby

Ecological Processes and Effects Committee

Chair: Dr. Kenneth Dickson
Designated Federal Official: Dr. Edward Bender
Staff Secretary: Ms. Frances Dolby/Ms. Marcy Jolly

Environmental Engineering Committee

Chair: Mr. Richard Conway
Designated Federal Official: Dr. Jack Kooyoomjian
Staff Secretary: Ms. Marcy Jolly/Ms. Diana Pozun

Environmental Health Committee

Chair: Dr. Arthur Upton
Designated Federal Official: Mr. Samuel Rondberg
Staff Secretary: Ms. Mary Winston

Indoor Air Quality/Total Human Exposure Committee

Chair: Dr. Morton Lippmann
Designated Federal Official: Mr. Robert Flaak
Staff Secretary: Ms. Carolyn Osborne

Radiation Advisory Committee

Chair: Dr. Oddvar Nygaard
Designated Federal Official: Mrs. Kathleen Conway
Staff Secretary: Ms. Dorothy Clark

Research Strategies Advisory Committee

Chair: Mr. Alvin Alm
Designated Federal Official: Mr. Randy Bond
Staff Secretary: Ms. Janice Jones

APPENDIX D--DRAFT GUIDELINES FOR SERVICE ON THE SCIENCE ADVISORY BOARD

I. BACKGROUND

The Science Advisory Board (SAB) was established in 1974 by the Administrator and in 1978 given a Congressional mandate to provide an independent source of scientific and engineering advice to the EPA Administrator on the scientific and technical underpinnings of Agency positions.

The SAB consists of approximately 60 members, who are appointed by the Administrator. These members serve on specific standing committees. The Chairs of the Committees also serve as members of the Executive Committee, which oversees all of the activities of the Board.

In many of its activities, the members of the Board are supplemented by the use of consultants, who are appointed by the SAB Staff Director after conferring with the Chair of the Executive Committee and the Chair of the Committee on which the consultant is to serve. Also, on occasion, Panels will be supplemented by "liaison members" from other governmental agencies. These people are invited by the Staff Director to participate in an ad hoc manner in order to bring their particular expertise to bear on a matter before the Board.

Both the Executive Committee and the permanent Committees may choose to conduct issue-specific business through Subcommittees that are chaired by SAB members. Reports from Subcommittees are reviewed by the respective permanent Committees. The Executive Committee reviews all reports, independent of their origin, prior to formal transmission to the Administrator. The sole exception is reports from the Clean Air Scientific Advisory Committee, which is a separately chartered FACA committee.

II. CRITERIA FOR SELECTION OF MEMBERS AND CONSULTANTS

The SAB is chartered as a Federal Advisory Committee, subject to the rules and regulations of the Federal Advisory Committee Act (FACA) (Public Law 92-463). The charter provides guidance and restrictions on selection of SAB members. The four most significant of which are:

1. Members must be qualified by education, training and experience to evaluate scientific and technical information on matters referred to the Board.
2. The composition of Board committees, subcommittees and panels must be "balanced", representing a range of legitimate technical opinion on the matter.
3. No member of the Board may be a fulltime government employee.
4. Members are subject to conflict-of-interest regulations.

The scientific and technical quality and the credibility of those selected is paramount and is the balance of technical opinion achieved. Secondary factors considered include the geographic, ethnic, sex, and academic/private sector makeup of committees. Other factors that contribute to, but do not determine, the selection include demonstrated ability to work well in a committee process, write well, and complete assignments punctually.

Nominations for membership/consultantship on the Board are accepted at any time. On a biannual basis, the SAB Staff Office publishes a notice in the Federal Register formally soliciting the names of candidates for SAB activities.

III. TERMS OF APPOINTMENTS

Members serve at the pleasure and by appointment of the Administrator. In order to provide suitable terms of service and to insure the infusion of new talent, the following guidelines are generally followed:

Members are appointed for two-year terms which may be renewed for two additional consecutive terms. Chairs of the standing committees are also appointed for two-year terms which may be renewed for an additional term. If a member is appointed as Chair, this term of service (2-4 years) is added to whatever term of service he/she may accrue as a member. For example,

Years as member	Followed by years as Chair	Followed by years as member	TOTAL years
2	0	0	2
2	2 or 4	0 or 2	4-6
4	2 or 4	0	6-8
6	2 or 4	0	8-10

Reappointment as a member is possible after a two-year hiatus from the SAB, during which time the individual may be called upon to serve as a consultant for a specific issue.

Since consultants are appointed to provide the necessary expertise for specific issues, their terms of appointment are for one year, renewable annually. Their formal appointments may be continued beyond completion of a given project so that their expertise can be quickly assessed in future with a minimum of paper-work.

In general, interagency liaisons participate for the term of issue resolution only.

IV. MEMBER AND CONSULTANT SELECTION PROCESS

Members are appointed by the Administrator based on nominations forwarded by the SAB Staff Director and the Chair of the Executive Committee. These nominations in turn are based on recommendations made by the Designated Federal Official (DFO--the member of the SAB Staff with principal responsibility for servicing standing Committees) and the Chairs of the standing Committees. The DFO has the responsibility for developing a list of candidates, utilizing all credible sources, including members of the SAB, other DFOs, EPA staff, staff at the National Academy of Sciences\National Research Council, trade groups, environmental groups, professional organizations, scientific societies, regulated industries, and the informed public.

An ad hoc Membership Subcommittee of the Executive Committee has been established to assist in the selection process. This group is consulted about possible names and used as a "sounding board" when decisions are being made about appointments. The Membership Subcommittee's principal role is to maintain the integrity of the process and to probe the extent to which objective selection criteria and procedures are being followed. They also raise questions about adherence to the Statement of Intent on Women and Minorities, adopted by the Executive Committee in 1990.

Consultants are appointed by the Staff Director following much the same procedure as for members with the exception that consultants are appointed to address a specific issue. This is addressed in more detail in the following section.

V. PANEL SELECTION PROCESS

In general, once the Board and the Agency have agreed upon a topic for SAB review, the subject is assigned to one of the standing Committees. The Committee Chair and the DFO have primary responsibility for forming a review Panel (the Committee or Subcommittee, as the case may be.) The Panel will contain some or

all members of the Committee. In many instances, consultants may also be added to the Panel in order to obtain specialized expertise on the particular issue under discussion.

A key aspect in the Panel selection process is the "charge", the mutually agreed upon description of what the Agency would like the review to accomplish and/or what the SAB expects to focus upon. The most helpful charge is one that prescribes specific areas/questions that need attention and/or answers. At a minimum, the elements of the charge should be sufficiently precise that the SAB can determine what additional consultant expertise is needed to conduct the most helpful review.

Often the DFO will begin by soliciting ideas about potential members from the Agency staff who are intimately acquainted with the issue and will often be aware of the most informed people. A conscious effort is made to avoid selecting individuals who have had a substantive hand in the development of the document to be reviewed. At the same time, experience has shown the utility of having some representation from individuals/groups who may have been involved in prior review of the issue or the document. The goal is to minimize the appearance or practice of an individual's reviewing his/her own work, while at the same time, maintaining an historical link to earlier deliberations surrounding the document/issue. Once the Agency staff has suggested nominees and provided background information on the individuals, their direct role in the panel selection process is complete. Agency staff, the requesting office, and others, may be consulted at a later stage for information about nominees received from other sources.

The goal is to gather a balanced group of experts who can provide an independent assessment of the technical matters before the Board. Discrete inquiries about the nominees are made with a number of different sources. This might include, for example, making inquiries with editors of newsletters, professional colleagues, and experts who are on "the other side" of the issue. As time and resources permit and controversy demands, names of nominees will be investigated via computer search of their publications and pronouncements in public meetings.

Of course, a determining factor is often the availability of the individual to participate in the public review. However, in the case of multiple-meeting reviews, the SAB will enlist the assistance of a particularly skilled consultant who cannot attend all meetings, but who is willing to do additional homework and/or participate via conference call.

In some cases, the Panel Chair consults with key members of the Panel for their advice before completing the empaneling process. The final selections for consultants are compiled by the DFO in conjunction with the Chair of the Panel and are submitted to the SAB Staff Director for discussion and appointment.

VI. CONFLICT-OF-INTEREST AND PUBLIC DISCLOSURE

The intent of FACA is to construct a panel of knowledgeable individuals who are free of conflicts-of-interest. In this regard, each Panel member must complete a confidential financial information form that is reviewed by the Deputy Ethics Officer to determine whether there are any obvious conflicts-of-interest. Legal conflict-of-interests generally arise in connection with "particular party matters".

In general, the SAB (in contrast with the FIFRA Scientific Advisory Panel (SAP)) does not get involved in "particular party matters"; hence, legal conflicts-of-interest are rare on the SAB. However, technical conflicts-of-interest can arise, particularly for participants from academic institutions, in connection with Panel recommendations for additional research studies. In most such cases, the DFOs work with the Panel members to apply for waivers from the conflict-of-interest concerns on this matter. The requests for waivers are evaluated on a case-by-case basis by EPA's Office of the General Council. (The Agency generally determines that the benefits to the country derived from these experts' recommendations for additional research, outweigh any technical conflict-of-interest that might be involved.)

However, the Board is also concerned about "apparent conflicts-of-interest". Consequently, consultants to the Panel are generally selected from the "broad middle" spectrum of opinion on the technical issue under discussion. Experience has shown that achieving balance through equal representation of extreme views reduces the chance of achieving a workable consensus--pro or con--that the Agency needs to move forward.

The "public disclosure" process is a mechanism aimed at resolving the apparent conflicts-of-interest issues. This procedure involves an oral statement (sometimes Panel members supplement this with a written document) that lays out the individual's connection with the issue under discussion; e.g., his/her area of expertise, length of experience with the issue, sources of research grants, previous appearance in public forums where he/she might have expressed an opinion, etc. This recitation of prior and/or continuing contacts on the issue assists the public, the Agency, and fellow Panel members in assessing the background from

which particular individual's comments spring, so that those comments can be evaluated accordingly. Public disclosure is a standard part of all SAB Panel meetings.

VII. CONCLUSION

These Guidelines are intended to assist the SAB in adhering to the mandates and spirit of the Federal Advisory Committee Act. By following these Guidelines the Board should be well-positioned to provide technically-sound, independent, balanced advice to the Agency. At the same time, they provide assurance that there will be adequate participation by and renewal with well-qualified experts from the various communities served by the Board.

APPENDIX E

SAB MEMBERS AND CONSULTANTS IN FY 91

ALPHABETIC LISTING
SCIENCE ADVISORY BOARD
MEMBERS

W/C Last Name	First Name	Address	Committees
M Alm	Alvin L.	Director and Senior Vice President Science Applications Internat. Corp. 1710 Goodridge Drive McLean, VA 22102	RSAC EXEC RRRSC
M Anderson	Mary	Prof of Geology University of Wisconsin Weeks Hall, RM 225 Madison, WI 53706	EEC
M Auerbach	Stanley	Consultant/ Env Sci Division Oak Ridge National Labs Mail Stop 6036 Bldg. 1505 Oak Ridge, TN 37831-6036	EPEC EXEC RSAC
M Boesch	Donald	Director, Ctr Estuarine Studies University of Maryland Systems Post Office Box 775 Cambridge, MD 21613	EPEC
M Bull	Richard	Prof & Chair, Pharm & Tox. Graduate Washington State Univ./Pharmacy College Pullman, WA 99163	DWC
M Carlson	Gary P.	Prof of Toxicology Purdue University 1334 R.E.Heine Phar. West Lafayette, IN 47907-1334	DWC EHC
M Carns	Keith E.	Director of Water Quality East Bay Municipal Utility District 375 11th Street Oakland, CA 94607	DWC
M Carpenter	George F.	Program Mgr/Superfund Pre-Remedial Michigan Dept of Natural Resources PO Box 30028 Lansing, MI 48909	EEC

ALPHABETIC LISTING
SCIENCE ADVISORY BOARD
MEMBERS

M/C Last Name	First Name	Address	Committees
M Cass	Glen R.	Prof of Envir/Mechanical Engineer. California Institute of Technology Mail Code 138-78 Pasadena, CA 91125	CASAC
M Clifton	Kelly	Prof of Human Oncology & Radiology Univer. of Wisconsin-Madison 600 Highland Avenue Madison, WI 53792	RAC
M Conway	Richard A.	Senior Corporate Fellow Union Carbide Corporation 3200 Kenesha Turnpk. South Charleston, WV 25303-0361	EEC EXEC RSAC RRRSC
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APPENDIX F - SAB MEETINGS FOR FY 91

EXECUTIVE COMMITTEE

1990	Oct 23-24	Quarterly Meeting
	Oct 24	Annual Meeting
1991	Jan 17-18	Quarterly Meeting
	Apr 18-19	Quarterly Meeting
	Jul 23-24	Quarterly Meeting

CLEAN AIR SCIENTIFIC ADVISORY COMMITTEE

1991	Apr 29-May 1	Carbon Monoxide
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DRINKING WATER COMMITTEE

1990	Oct 25-26	Trihalomethanes
	Dec 6-7	VIRACT (groundwater viral transmission)
1991	Jan 2	Arsenic Research I (teleconference)
	Jan 15	Arsenic Research II (teleconference)
	Jan 25	Arsenic Research III (teleconference)
	Feb 7-8	Colilert (Microbiological Protocols)
	Apr 4-5	Cyanogen Chloride/Chlorinated Acids
	May 9-10	Corrosion Research

ECOLOGICAL PROCESSES AND EFFECTS COMMITTEE

1990	Oct 25-26	EPEC Committee Meeting
1991	Jan 9-11	Expert Systems for Predicting the Environmental Fate and Effects of Chemicals
	Feb 19-20	Proposed National Center for Marine and Estuarine Disease Research
	Mar 18-19	EMAP Program Plan
	Apr 15-16	National Estuary Program Monitoring Guidance Document
	Apr 16-17	EPA/COE guidance document "Bio-evaluation for Proposed Ocean Disposal of Dredged Material" I
	May 20-22	EPA's Research for Ecorisk Assessment
	Jun 13-14	Consultation on Biological Criteria

Jul 16-17	EPA's Wetlands Research Program
Sep 24	EPA/COE guidance document "Bio-evaluation for Proposed Ocean Disposal of Dredged Material" II

ENVIRONMENTAL ENGINEERING COMMITTEE

1990	Oct 25-26	Planning/Coordination/Review Meeting
	Dec 7	OSWER Modeling (teleconference)
	Dec 19	Recycling Health Consultation (teleconference)
1991	Feb 7-8	Mid-year Planning/Coordination/Review Meeting
	Apr 11-12	Pollution Prevention Research Plan
	May 29-30	Explosives and Flammables
	Jun 27-28	End-year Planning/Coordination/Review Meeting and Groundwater Consultation
	Jul 17-18	Wetlands Construction

ENVIRONMENTAL HEALTH COMMITTEE

1990	Oct 25-26	Formaldehyde Consultation/RfC Inhalation Toxicology and Occupational Exposure Limits
1991	Feb 28-Mar 1	Chemical Mixtures Health Research Strategy/Chemical Mixtures Exposure
	Mar 26-27	Perchloroethylene/Rat Kidney Tumors
	Jul 17-18	Formaldehyde Risk Assessment

INDOOR AIR QUALITY AND TOTAL HUMAN EXPOSURE COMMITTEE

1990	Dec 4-5	ETS Risk Assessment and Policy Guide
1991	Sep 12-13	Exposure Assessment Guidelines

RADIATION ADVISORY COMMITTEE

1990	Oct 25-26	Radionuclides in Drinking Water/ Correlation of Short and Long Term tests for Radon/National Survey of Radon in Schools
1991	Jan 14-16	Electromagnetic Fields (EMF) I
	Feb 4-6	Residual Radioactivity Commentary/Radionuclides in Drinking Water Cover Letter/Idaho Radionuclide Study
	Apr 12-13	Electromagnetic Fields (EMF) II
	May 20-22	Radon Risk Assessment/Idaho II/Transport Commentary
	Jun 8-4	Writing Session on EMF
	Jun 14	Writing Session on EMF (Teleconference)

Jun 19	Writing Session on EMF (Teleconference)
Jul 23-25	EMF Cancer and Research
Sep 18-20	Citizen's Guide/EMF Cancer Risk Assessment/ Radionuclides in Drinking Water/Idaho III/Residual Radioactivity/Transport Commentary

RESEARCH STRATEGIES ADVISORY COMMITTEE

1991 Feb 26-27	ORD Research Budget
Mar 11-12	Scientific and Technical Achievement Awards
Jul 19	New Approach to Research Planning

APPENDIX G

FY 1991 - SAB REPORTS AND AGENCY RESPONSES

G-1

NUMBER	COMMITTEE	CHAIR	TOPIC	DATE	RESPONSE
001	EPEC	Dickson	Evaluation of the Ecological Indicators Report for EMAP	11/6/90	01/18/91
002	EHC	Upton	Review of issues relating to the health effects of ingested pentachlorophenol	11/26/90	05/07/91
003	EPEC	Dickson	Evaluation of the Ecoregion Concept	01/22/91	04/29/91
004	DWC	Glaze	Review of ORD's Drinking Water Microbiology Research Plan	02/27/91	05/02/91
005	EC	Neuhold	Review of the FY92 President's Budget for Research and Development	03/08/91	05/02/91
006	RSAC	Alm	Scientific & Tech. Achievement Awards Letter	04/29/91	08/05/91

<u>NUMBER</u>	<u>COMMITTEE</u>	<u>CHAIR</u>	<u>TOPIC</u>	<u>DATE</u>	<u>RESPONSE</u>
007	IAQTHEC	Lippmann	Health Effects of Passive Smoking: Assessment of Lung Cancer in Adults & Respiratory Disorders in Children	04/19/91	
008	EHC	Upton	Interim Methods for Development of Inhalation Reference Concentrations	04/29/91	07/01/91
009	EEC	Conway	Review of the Office of Research & Development's Municipal Solid Waste Research Program	05/16/91	08/05/91
010	CASAC	McClellan	Review of ORD Draft Research Plan Effects of Tropospheric Ozone on Forest Trees	07/23/91	
011	EPEC	Dickson	Evaluation of the Program Plan for EMAP	07/30/91	11/6/91
012	EPEC	Dickson	Eval. Proposed Ctr. for Marine & Estuarine Disease Research	07/30/91	10/9/91

<u>NUMBER</u>	<u>COMMITTEE</u>	<u>CHAIR</u>	<u>TOPIC</u>	<u>DATE</u>	<u>RESPONSE</u>
013	EHC	Weiss	Review of ORD Draft Document "Response to Issues & Data Submissions on the Carcinogenicity of Perchloroethylene.	08/16/91	
014	DWC	Ray	Review of Protocol for Microbiological Testing of Drinking Water	08/16/91	10/24/91
015	CASAC	McClellan	Air Quality Criteria for Carbon Monoxide	07/17/91	
016	EEC	Conway	Usage of Computer Models in the Hazardous Waste & Superfund Programs	09/06/91	11/27/91

FY 1991 - SAB LETTER REPORTS AND AGENCY RESPONSES

<u>NUMBER</u>	<u>COMMITTEE</u>	<u>CHAIR</u>	<u>TOPIC</u>	<u>DATE</u>	<u>RESPONSE</u>
LTR-001	RAC	Nygaard	Radon Risk Estimates for General Population and Smokers, Non- Smokers, and Children	01/22/91	04/11/91
LTR-002	EHC/Metals	Upton/Weiss	Review of a Proposed Revision to the Reference Dose for Nickel	03/15/91	03/15/91
LTR-003	EHC/Metals	Upton/Weiss	Review of the Calculation of RfD's for Minerals which are nutritionally essential	03/26/91	06/06/91
LTR-004	EHC	Upton	Occupational Exposure Limit Data in Relation to Inhalation Reference Concentrations	04/29/91	06/19/91
LTR-005	EEC	Conway McMichael	Potential Hazards of Municipal Waste Recycling	04/29/91	07/3/91

<u>NUMBER</u> <u>RESPONSE</u>	<u>COMMITTEE</u>	<u>CHAIR</u>	<u>TOPIC</u>	<u>DATE</u>	<u>RESPONSE</u>
LTR-006	EHC	Weiss	Review of the draft document Alpha-2u Globulin: Association Association with Chemically Induced Renal Toxicity and Neoplasia in the Male Rat.	08/20/91	11/27/91

FY 1991 - SAB CONSULTATIONS

NUMBER	COMMITTEE	CHAIR	TOPIC	DATE
CON-001	EHC	Upton	Assessment of Health Risks to Garment Workers and Certain Home Residents from Exposure to Formaldehyde	11/21/90
CON-002	EEC	Conway/Small	Review of Selection Criteria for Participation of EPA Staff on the Proposed Agency Task Force on Modeling	04/29/91
CON-003	EEC	Conway	Review of Quantitative Data Quality Objectives for Ground-Water Monitoring	07/24/91
CON-004	EPEC	Dickson	Biological Criteria	07/30/91
CON-005	EXEC	Loehr	Cancer Risk Assessment Guidelines	09/30/91

FY 1991 - SAB REPORT ABSTRACTS

001 Evaluation of the Ecological Indicators Report for EMAP

This report presents the conclusions and recommendations of the U. S. Environmental Protection Agency's Science Advisory Board following a review of the draft document "Ecological Indicator Report for the Environmental Monitoring and Assessment Program" (EMAP). EMAP, the Agency's program to monitor the status and trends of regional and national ecological resources, will evaluate and use indicators to measure and describe the overall condition of ecosystems. Specific sets of indicators which quantify response to anthropogenic stress (response indicators), exposure to pollutants or causes of poor condition (exposure indicators), and measure human activities which are suggestive of environmental stress (stressor indicators) are being evaluated for each class of ecosystem. This approach is evolving and the Subcommittee considered that EMAP had made good progress through its peer reviews of the overall approach and the interim plan for indicators. The development of indicators was in different stages for each of the ecosystems; however, the use of a field demonstration pilot is a good technique which could promote interactions between the ecosystem scientists. The terminology for defining "nominal", "subnominal", and "habitat indicator" should be clarified and selection of indicators by all ecosystem classes should be better coordinated and integrated with ecological risk assessment principles. The EMAP team should rely on historical data, where possible, to estimate sampling requirements and assess trends, and they should reassess their ability to identify casual relationships through this regional scale of monitoring. Other comments and suggestions for clarification are provided in the report.

Key Words: indicators; environmental quality; monitoring; stress.

002 SAB review of issues relating to the health effects of ingested pentachlorophenol

The SAB's Environmental Health Committee (EHC) reviewed issues relating to the health effects of ingested pentachlorophenol. (1) interpretation of the observed relationship between mouse liver toxicity and tumor incidence. The Committee recommended that the dose-dependent increase in the incidence of hepatocellular carcinomas and adenomas that was observed should be considered a valid indicator of oncogenicity. (2) relevance of the observed increase in incidence of mouse pheochromocytomas to humans. The Committee concluded that the incidence and dose-response pattern of such tumors in mice suggest that their increased rate of occurrence was clearly related to the administration of the test agent; however, the fact that the increase was limited to benign and not malignant pheochromocytomas led the Committee to question whether these tumors are related to human cancer. (3) selection of the data set(s) that should be used in formulating quantitative estimates of human cancer risk. The Committee recommended the use of the observed dose-incidence data on hemangiomas and heman-giosarcomas as the basis on which to assess the cancer risk for humans, since

these tumors are more likely than the others to be known human cancers. (4) whether a toxicity-equivalence-factor approach should be considered for the liver tumors. The Committee recommended that it not be used.

Key Words: pentachlorophenol; health effects.

-003 Evaluation of the Ecoregion Concept

This report presents the conclusions and recommendations of the U. S. Environmental Protection Agency's SAB following a review of EPA research on the Ecoregion Concept and presentation of the results of its application for water quality management by three states. The Ecoregion Concept is a method of dividing large geographic areas into regions or subunits in which the variability of selected ecological and physical characteristics is less than that of the entire area. The Ecoregion Concept, as published by EPA, is being used by some states for water quality management. The principal concerns of the Subcommittee are that limited guidance and documentation is available to users for defining and locating the boundaries and establishing adequate reference sites and that informal methods are used to subdivide areas. The Subcommittee endorsed the concept but recommended that EPA renew and sustain its research in critical areas, conduct a pilot project to compare the effectiveness of Ecoregions with other regionalization techniques, and develop a users guide, which includes case studies, to assist future applications.

Key Words: ecoregions; regionalization; environmental management

004 Review of the Office of Research and Development's Drinking Water Microbiology Research Plan

The SAB's Drinking Water Committee reviewed the Office of Research and Development's research program in the area of drinking water microbiology. The charge to the committee was to determine if the current and future programs in the area of microbiology research by the ORD were adequate to provide the scientific basis for regulations.

The Committee concluded that the drinking water microbiology research program to support the regulatory effort is inadequate, underfunded and disproportionately low compared to the research effort on chemical contaminants. The DWC made four recommendations concerning the microbiology research program. First the DWC recommended that the Agency engage in prospective epidemiological-microbiological studies in order to verify the models for assessing microbial health risks and to identify the best indicators of the microbial quality of water. Second the Committee recommended that research on microbial risk modeling and risk assessment be extended, formalized and reconciled with the level and nature of such current research for chemical contaminants. Third the Committee recommended the re-direction of several existing research efforts and the addition of new ones in order to best meet regulatory priorities. Specifically, new and/or

expanded research efforts are needed on (i) direct detection and improved indicators of viral and protozoan pathogens; (ii) *Legionella* contamination of drinking water (iii) Methods to measure microbial growth potential in water; and (iv) the development of gene probe detection methods for the highest priority waterborne viruses, specifically Norwalk and related viruses, hepatitis A virus and rotaviruses. Lastly the Committee recommended the expansion of research on distribution systems to include: (i) better measures of microbial growth potential, (ii) maintenance of disinfectant residual, (iii) distribution system maintenance, (iv) nitrification, biofilms, particulate and opportunistic pathogens in distribution systems, (v) modeling of distribution systems, and (vi) establishing the relationships between system design, operation, maintenance and water quality.

Key Words: microbiology; research plan; drinking water

005 Review of the Fiscal Year 1991 President's Budget for Research and Development

The SAB reviewed the FY91 budget proposed for ORD and found that ORD has responded admirably to a myriad of environmental concerns facing our nation, and even the world. Still, the office will continue to be incapable of providing an adequate response to environmental issues without a significant infusion of resources. Base programs (both core and non-core, including professional development) must be shored up to prevent further erosion of the in-house capabilities. Extramural resources (including those for competitive grants, centers, and professional fellowships) must be increased in order to foster innovative and timely research by other leading researchers in the environmental research fields. Finally, serious attention must be paid to the aging equipment and facilities (infrastructure) of the organization through increases each year which are earmarked for these areas. The SAB applauds ORD's continuing efforts to implement certain recommendations in the SAB reports "Future Risk" and "Reducing Risk." However, continuing budgetary disruptions consistently hinder its management's ability to stabilize its core program and expand high priority areas which are sorely underfunded. In light of these circumstances, the Board strongly recommends significant increases for ORD over the next 5 years. Several specific activities which should receive immediate attention include:

1. Inadequate base for replacement/upgrade of scientific equipment.
2. Insufficient funding to cover salary and expense costs.
3. Lack of training resources for scientific staff.
4. Insufficient funding for competitive grants and centers.

Key Words: core, extramural, infrastructure, budget, research

006 Recommendations on the 1990 EPA Scientific and Technological Achievement Award Nominations

The report represents the conclusions and recommendations of the U. S. Environmental Protection Agency's Science Advisory Board regarding the 1990 EPA Scientific and Technological Achievement Awards (STAA) program. The Board reviewed and evaluated 120 papers that were nominated by EPA managers and recommended twenty-four (20%) papers for awards, plus four additional papers with honorable mention. Eleven EPA research laboratories were represented among these awards. The report recommends that the Agency clarify its instructions to nominators. The Subcommittee also encouraged the Agency to support the program at the highest levels of management.

Key Words: awards, scientific achievements, contest

007 Health Effects of Passive Smoking: Assessment of Lung Cancer in Adults and Respiratory Disorders in Children

The Indoor Air Quality and Total Human Exposure Committee conducted its review of the environmental tobacco smoke draft documents. In summary, the Committee found the risk assessment document to be a good faith effort to address complex and difficult issues affecting public health. Since the task is extremely difficult, it should come to no surprise that the Committee also found the document to be incomplete in many respects. The IAQTHEC has suggested changes both in the organization and specific technical content of the draft, that if followed, can result in an improved ETS risk assessment document. The Committee also suggested changes that would strengthen the use of the incorporated scientific database to support the recommendations contained in the policy guide.

Key Words: environmental tobacco smoke (ETS); carcinogenicity; passive smoking; sidestream smoke; meta-analysis; confounders; lung cancer; respiratory disease

008 Interim Methods for Development of Inhalation Reference Concentrations

Inhalation Reference Concentrations (RfCs) were developed to serve as a basis for health risk estimates for non-cancer effects (analogous to the oral Reference Dose (RfD)) resulting from exposure to airborne pollutants. The SAB reviewed the methodology for development of inhalation RfC values, as described in the document "Interim Methods for Development of Inhalation Reference Concentrations," as requested by EPA's Office of Research and Development.

The Committee found the proposed methods for deriving RfCs to be reasonable, although some specific improvements, such as the use of the benchmark dose in place of the No Observed Adverse Effects Level/Lowest Observed Adverse Effects Level (NOAEL/LOAEL), were proposed. Methods to determine RfCs should retain flexibility to accommodate the specific information and characteristics of various toxic substances, and could incorporate a tiered approach in

which simpler methods are applied before the more sophisticated methods defined in the documents reviewed are used.

Key Words: RfC; inhalation reference concentration; benchmark dose; dosimetry; methodology

009 Review of the Office of Research and Development's Municipal Solid Waste Research Program

The Municipal Solid Waste Subcommittee of the Environmental Engineering Committee of the Science Advisory Board has prepared a Research-In-Progress report on the Agency's Municipal Solid Waste research program. The review examined the Agency's strategic planning for integrated waste management, source reduction, recycling, thermal destruction, land disposal and special wastes management (combustion residuals, sewage sludge and medical/infectious wastes).

The Subcommittee suggested priority shifts in the proposed research areas, recommending that source reduction and disposal in landfills should be top research priorities, while thermal destruction and special wastes management should have lower research priorities. It was further recommended that recycling research should be coordinated with source reduction research. Also stressed was the need for the Agency to serve as a catalyst in dealing with MSW issues. Such activities as information dissemination, sponsoring conferences and workshops, developing decision tools, providing technology evaluation expertise, catalyzing market and product development, conducting fate and effect and treatability studies, developing incentives, providing grants and loans, and related supportive activities were viewed as vital to the Agency's mission for MSW research. The SAB views the MSW research program to be very important to the thousands of operating state and local MSW programs throughout the country.

Key Words: municipal solid waste, municipal solid waste research, municipal solid waste research programs, integrated waste management

010 Review of ORD's draft research plan Effects of Tropospheric Ozone on Forest Trees

The Forest Research Subcommittee of the Clean Air Scientific Advisory Committee reviewed in public session the U. S. Environmental Protection Agency's research plan: "Effects of Tropospheric Ozone on Forest Trees." The Subcommittee unanimously endorses the plan as a scientifically sound program and one that is responsive to the needs of the Agency. The plan addresses the role of welfare effects in standard setting, and provides for parallel modeling and experimental task to scale site-specific and time-specific data to regional and national concerns. The Subcommittee offers recommendations on selected aspects of the plan, and

looks forward to the plan's products providing a unique data base which will help in developing the secondary National Ambient Air Quality Standards for ozone.

Key Words: ozone; forest; ambient air standards; productivity; welfare

011 Evaluation of the Program Plan for EMAP

This report presents the conclusions and recommendations of the U. S. Environmental Protection Agency's Science Advisory Board following a review of EPA's Program Plan and a briefing on ecological risk characterization for the Environmental Monitoring and Assessment Program (EMAP). This is the second in a series of reviews by the SAB of the components of EMAP. The Subcommittee recommended that EPA revise its Program Plan to clarify the purpose, goals, and objectives of EMAP and so explain how EMAP can support policy decisions. They recommended that EMAP further examine its role in risk assessment; one which is critical toward accomplishing Agency goals. The Subcommittee recommended that EMAP illustrate the integration and assessment portion of its program using data from the Near-Coastal and Forest pilot projects and present this analysis to the SAB for review.

Key Words: environmental monitoring; ecosystem assessment; ecological risk assessment

012 Evaluation of the Proposed Center for Marine and Estuarine Disease Research

This report presents the conclusions and recommendations of the U. S. Environmental Protection Agency's Science Advisory Board following a review of an EPA proposal for a national center for marine and estuarine disease research. The Task Group agreed that there is a need for a center related to diseases of marine and estuarine organisms and that the Gulf Breeze Environmental Research Laboratory was a logical site for an EPA center. The Task Group was concerned that in order to achieve the desired results the proposal needed to be revised. They recommended that the scope of the proposal be reduced, more details be added, and that the pathobiology group reach out to other technical areas for support and ideas in the planning and implementation stage. Strategies on how each of the proposed programs will be chosen and implemented should be added.

Key Words: marine diseases; pollution induced disease; research center

013 Review of ORD draft document Response to Issues and Data Submissions on the Carcinogenicity of Tetrachloroethylene (Perchloroethylene).

The available scientific evidence confirms that perchloroethylene should be considered as an animal carcinogen, based on three endpoints in two species: liver tumors in male and female mice, kidney tumors in male rats, and, possible, mononuclear cell leukemia in male and female rats. However, each of these

endpoints is problematic with respect to its relevance for human cancer. The Committee found that the evidence does not warrant designation of perc as a probable human carcinogen, but noted that the evidence for carcinogenicity is stronger than for most other compounds classified as possible human carcinogens.

Therefore, in the spirit of the flexibility encouraged by the Guidelines, the Committee places this compound on a continuum between these two categories.

Key Words: carcinogen; alpha-2u-globulin; peroxisome proliferation; carcinogen assessment guidelines; perchloroethylene; perc; PCE; liver tumors; mononuclear cell leukemia

014 Review of Protocol for Microbiological Testing of Drinking Water

The Science Advisory Board's Drinking Water Committee discussed the Office of Drinking Water's and Office of Research and Development's proposed protocol for microbiological testing of drinking water. The specific charge to the Committee addressed the adequacy of the protocols for a study in which detection of low densities of chlorine-injured *E. coli* is being compared among several analytical methods, including the Colilert test; methods for subculture (transfer) of *E. coli* from Colilert tubes to EPA-approved media; needed incubation times for such subcultures; and the use of sewage as a "spike" for drinking water samples. The Committee found that additional testing is necessary to validate the usefulness of the Colilert and similar tests for the detection of low levels of chlorine injured coliforms. The Committee feels that the protocols reviewed at this meeting are a correct approach and have only some minor suggestions for improving them. Among these suggestions are: evaluating the effect of the centrifugation procedure in possibly inducing collateral injury; assessing the effect of holding time on bacterial detection; measuring the concentrations and species of chlorine at several time intervals; and using a minimum of 40 tubes inoculated per dilution.

Key Words: colilert; *E. coli*; chlorine-injured; subculture; microbiology

015 Review of Draft Air Quality Criteria for Carbon Monoxide

The Committee unanimously concluded that the document, with minor revisions provides a scientifically balanced and defensible summary of the current knowledge of the effects of this pollutant and provides an adequate basis for the EPA to make a decision as to the appropriate primary NAAQS for carbon monoxide.

Key Words: air quality; carbon monoxide

016 Use of Computer Models in the Hazardous Waste and Superfund Programs

The Subcommittee stated that the conclusions drawn in the report are consistent with the data and information presented. The Subcommittee suggested

a number of improvements to the draft report, particularly regarding the accuracy of models listed and the use of multiple names for a given model.

Follow-up studies were recommended, involving case studies of model use in OSWER programs and further consideration of the types of training and education that are appropriate for different modeling activities.

The Subcommittee found that the proposed OSWER pilot study on soil contamination models, while addressing an issue of great concern to the Agency, was probably not well suited as a test case for examining issues in model administration, due to the significant scientific uncertainty and research nature of these models. Rather, a project in a more established modeling domain, such as ground water flow models, was suggested to allow the study to focus better on administrative issues related to model selection and use at EPA.

The Subcommittee strongly supports the model management initiative taken by the OSWER Information Management staff, and endorses extension of the activity Agency-wide through an Agency Task Force on Modeling.

Key Words: mathematical models, superfund, CERCLA, RCRA, computer model validation, ground water models, soil contamination

FY 1991 - SAB LETTER REPORT ABSTRACTS

RAC-LTR-91-001 Radon Risk Estimates for General Population and Smokers, Non-Smokers, and Children

Review of the draft document "Estimation of Risks from Indoor Radon Exposure." For the general population, EPA derived an average life-time risk of 360 excess lung cancers per million person-working level months. While the Committee found this acceptable, it recommended presenting the risk estimate with an uncertainty range. Because of the near-multiplicative interaction between radon exposure and smoking, the Committee recommended that EPA qualify the overall population risk from exposure to radon by indicating the comparative risks to smokers and non-smokers. Technical consensus documents disagree over whether children are at greater risk. Until such time as additional data and analyses addressing this issue become available, the Committee finds it acceptable for EPA to consider those exposed to radon as children to be at slightly higher risk for lung cancer. However, as new data and new analyses become available, EPA should prepare to re-evaluate these risks.

EHC-LTR-91-002 Review of a proposed revision to the Reference Dose (RfD) for Nickel

The Metals Subcommittee of the SAB considered a revision of the RfD for nickel, based on reproductive toxicity and dermatotoxicity data. The Office of Drinking Water proposal called for a new RfD derived either from reproductive studies (yielding an RfD of $1.0 \mu\text{g/kg day}^{-1}$), or a RfD derived from dermal toxicity research (yielding an RfD of $2.0 \mu\text{g/kg day}^{-1}$). The Subcommittee recommended against both these options. First, it was not persuaded by the empirical data. Second these values are less than the amounts consumed in typical diets distorting their translation into regulatory standards. Moreover, a compilation of the most cogent of the alternative data fails to yield an RfD substantially different from the current one.

The Subcommittee recommends that $12 \mu\text{g/l}$ serve as the MCLG until supplanted by newer data.

EHC-LTR-91-003 Review of the Calculation of RfDs for Minerals which are nutritionally essential

The Metals Subcommittee met to consider the calculation of RfDs for minerals which are nutritionally essential but which present the possibility of toxicity. Chromium, selenium, and zinc are examples of minerals that serve essential biological functions at low dietary levels but that can elicit toxic responses at high levels. Such a dual role poses difficulties for EPA's attempts to set RfDs and to translate them into exposure standards. The Subcommittee noted that at least part of the problem stemmed from current Agency practices, which rely upon arbitrary values, such as NOAELs, to calculate RfDs.

Inadequate and excessive intakes both incur health costs. Consequently, a different method of calculating exposure standards than that currently practiced by the agency is required to deal with this unique condition. In particular, a method is required that uses the complete dose-response function in calculating allowable levels. It recommended that the Agency develop and maintain liaisons with the Food and Nutrition Board of the National Academy of Sciences, which establishes Recommended Daily Allowances, and the Food and Drug Administration, to coordinate the roles and interests of the three organizations in proposing dietary intake standards.

EHC-LTR-91-004 Review of the Risk Assessment Forum's Draft Report "Occupational Exposure Limit Data in Relation to Inhalation Reference Concentrations"

The Forum asked the SAB to comment upon the following Forum recommendations:

1. Occupational Exposure Limit (OEL) values, per se, should not be used to develop inhalation RfCs.

2. An adequate scientific data base supporting an OEL may be used in the development of an inhalation RfC. Such data should be used in accordance with EPA's suggested methodology.

3. In the absence of an adequate data base, an RfC cannot be developed. Risk assessors then must make a professional judgement about protective levels of airborne toxicants based on whatever information is available. This information may include an OEL and its data base.

4. Once a determination is made that the existing data are inadequate, the Agency group expressing interest in the chemical should initiate action to see that data are developed through the interagency committee.

The EHC believes that it is very important that the Agency employ consistent methods to evaluate and access toxicity information. The Committee recognizes that the methods used to define OELs can be subjective and can differ from the methods suggested by the Agency. Hence the EHC heartily endorses the Risk Assessment Forum's recommendations on the use of OELs, adding only to the Forum's recommendation that data additional to that in the data base supporting an OEL, if available, should also be included when deriving an inhalation RfC. The EHC also suggests that OELs be incorporated for informational purposes within EPA documents deriving inhalation RfCs, and when there is a substantial difference between the OEL and the inhalation RfC, some discussion of this difference should be made.

EEC-LTR-91-005 Review of ORD's Proposed Project Entitled "Potential Hazards of Municipal Waste Recycling"

To confer with the Environmental Criteria and Assessment Office of the Office of Health and Environmental Assessment of the Office of Research and Development on recommendations related to the balance of the scope of work for the project entitled "Potential Hazards of Municipal Waste Recycling," and to provide recommendations for a proposed expert panel to be formed by ECAO to guide and critique the study. The Subcommittee suggested that the Agency reduce the scope of the project to identify hazards associated with recycling municipal solid waste; to identify the target audience of the project; to recognize and define the type of recyclables for this study; to embrace the notion of a requirement of ultimate (waste) disposal for fractions not amenable to recycling; to avoid an a priori declaration of recyclable material types based upon a predisposition toward a particular technology; to focus on post-consumer flows; to consider dispelling myths and clarifying or substantiating anecdotal information associated with recycling, and; to consider data from developing countries which may have epidemiological studies on scavenging from disposal areas should be sought.

EHC-LTR-91-006 Review of the draft document Alpha-2U Globulin: Association with Chemically Induced Renal Toxicity and Neoplasia in the Male Rat.

The EHC was asked to review the Risk Assessment Forum's analysis of the following three issues (a, b, c) and to comment on the fundamental tenets (1 through 5) underlying their conclusions:

- a. The specificity of the alpha-2u-globulin nephropathy for the male rat.
- b. The linkage of alpha-2u-globulin nephropathy in the male rat to neoplasia of the renal tubules.
- c. The recommendation advising against the use of male rat renal tubule tumors associated with the alpha-2u-globulin syndrome for human risk assessment.

Comments on the five fundamental elements in the Technical Panel's rationale:

1. Since renal tubule toxicity induced in the male rat by the alpha-2u-globulin mechanism is unlikely to occur in humans, renal tumors in humans are not likely to occur via this mechanism.
2. The applicability of the alpha-2u-globulin mechanism to the male rat renal tubule response can be determined even when there are other forms of chemically-induced nephrotoxicity or increased incidence of cancer at other sites in the rat or other species.
3. If a chemical induces alpha-2u-globulin accumulation in hyaline droplet

the associated nephropathy observed in male rats may not be an appropriate endpoint for assessing non-cancer risk in humans.

4. Renal tubule tumors in the male rat that appear following administration of clearly mutagenic agents may be appropriate for the characterization of human risk on a case-by-case basis even when alpha-2u-globulin accumulation has been observed.

5. The information on other laboratory species tested to date supports the conclusion that the protein-induced renal tubule toxicity occurs only in the male rat. The Technical Panel expressed a low level of concern for the possibility that functionally analogous human proteins exist.

APPENDIX H

BIOGRAPHICAL SKETCHES OF THE SCIENTIFIC STAFF MEMBERS

Staff Director:

Dr. Donald G. Barnes

Assistant Staff Director:

Mr. A. Robert Flaak

Designated Federal Officials:

Dr. Ed Bender

Mr. Randy Bond

Mrs. Kathleen Conway

Dr. C. Richard Cothorn

Dr. K. Jack Kooyoomjian

Mr. Samuel Rondberg

DR. DONALD G. BARNES

Staff Director and Designated Federal Official for the Executive Committee

DR. DONALD G. BARNES assumed his position as Staff Director in March, 1988. He came to the SAB from nearly ten years' service as Senior Science Advisor to the Assistant Administrator for Pesticides and Toxic Substances. In that role he became involved with a number of controversial issues; e.g., pesticide re-registrations and the implementation of Section 5 of TSCA. His claim to infamy, however, is his long association with "dioxin"; i.e., 2,3,7,8-TCDD. For many years, he served as the Agency's principal technical point of contact on "dioxin" issues; e.g., 2,4,5-T cancellation hearings, Agent Orange resolution, and emissions from municipal waste combustors. His national and international (WHO and NATO) contributions, while not stilling the controversy, have generally not exacerbated it--reason enough, one might say, to justify his receiving two EPA Gold Medals for Superior Service for these activities.

Dr. Barnes has also been active in the area of risk assessment. He was one of the Agency representatives to the Office of Science and Technology Policy-led effort to produce a consensus view of cancer in the Federal government; i.e., Cancer Principles. He was active in the writing of Agency's risk assessment guidelines for cancer and for mixtures. As a member of the EPA Risk Assessment Forum, he joins with other senior scientists in addressing complex risk issues that affect different program offices. As former Coordinator and now Member of the EPA Risk Assessment Council, he is actively involved with the policy review of scientific positions on risk.

FY 91 saw his induction into the Senior Executive Service and receipt of a Gold Metal for his coordination of the *Reducing Risk* report.

Prior to coming to EPA, Dr. Barnes was Associate Professor and Science Division Chair at the innovative St. Andrews Presbyterian College in North Carolina. Today, his teaching itch gets scratched through stints as "risk assessment trainer" in EPA's Training Institute.

His formal education includes a BA (chemistry) from the College of Wooster, a PhD (physical chemistry, with a minor in physics) from Florida State University, and subsequent graduate courses in several health-related areas; i.e., pharmacology, toxicology, immunology and epidemiology. His real world education is provided by Dr. Karen K. Barnes and two college-aged sons.

DR. EDWARD BENDER

Designated Federal Official for the Ecological Processes and Effects Committee.

DR. EDWARD S. BENDER is the Designated Federal Official for the Ecological Processes and Effects Committee. He has assisted the Committee to expand its agenda with reviews of several interesting and diverse issues, including sediment criteria, ecological risk assessment research, wetlands, marine monitoring and disease research, and planning for the Environmental Monitoring and Assessment Program.

Prior to joining the SAB, Dr. Bender spent ten years working in EPA's National Pollutant Discharge Elimination System enforcement program as an expert in biological monitoring of effluents. In this position, he helped develop and/or revise the program policies and guidance for self-monitoring by permit holders, compliance inspections and reporting, and civil and administrative penalties. He reviewed over 100 litigation reports that alleged violations of permit conditions and he also provided technical support, including expert testimony in two trials. In one case, the US vs Olin Corp. he helped negotiate the clean-up and restoration of a National Wildlife Refuge that was contaminated with DDT. Prior to his work with EPA, he conducted ecological assessments and research for the Army at ammunition plants, arsenals, and depots throughout the United States. He also joined an expedition to Greenland, where he backpacked through the tundra to band nestlings and to collect from series of peregrine falcons.

Dr. Bender received a B.S. from Westminster College, New Wilmington, PA, an M.S. (Zoology) from the University of Florida, Gainesville, FL, and a PhD. from Virginia Polytechnic Institute and State University, Blacksburg, VA. His dissertation research focused on the process of recovery of a stream macroinvertebrate community from chronic DDT contamination.

Dr. Bender and his wife, June, share their interests and labors in horticulture and home improvement projects and in raising their three daughters.

MR. RANDALL BOND

Designated Federal Official: Clean Air Scientific Advisory Committee and Research Strategies Advisory Committee

Randall Bond joined the Science Advisory Board staff in December, 1990. Randy started with EPA as student assistant to the Medical Science Advisor in 1976 while working on his undergraduate degrees in chemistry and biology. After finishing school, he accepted a position with ORD's Office of Research Program Management where he served as Executive Secretary to the newly formed Pesticides Research Committee and the Chemical Testing and Assessment Research Committee. Randy has also served as participant in the LEGIS (Congressional Fellowship) program, and serves as EPA coordinator for animal welfare issues. He has also chaired a number of international committees related to biological environmental specimen banking. His most recent position was in ORD's Office of Health Research where he coordinated pesticides and toxic substances health research issues and served as the Chairman for the committee responsible for planning all TSCA related research and development activities.

MRS. KATHLEEN CONWAY

Designated Federal Official: Radiation Advisory Committee

MRS. KATHLEEN CONWAY received her BS and MS from Tufts University where she studied biology, public health, and sanitary engineering. Between degrees she wrote for the Hartford Courant. Mrs. Conway was a sanitary engineer for the Massachusetts Department of Public Health, where she worked with 80 cities and towns on a variety of water supply, waste disposal, and sanitation issues. She initiated training programs on sanitary landfill operations for local Boards of Health and landfill operators. She joined the U. S. Environmental Protection Agency's Region I in 1974 to work in the wastewater treatment plant operations and maintenance program. She inspected wastewater treatment plants constructed with federal money, taught classes for operators, and served on a team which investigated the MDC system, one of the ten largest in the nation. During this time she chaired the Boston Section of the Society of Women Engineers.

In 1977 she joined the Office of Research and Development. Her subsequent service as acting Director for two divisions in the Office of Health Research lead to her selection, in 1982, as a participant in the President's Executive Exchange Program. During her exchange year she worked with an occupational health and safety unit at IBM. She served the Science Advisory Board as Deputy Director from 1984 to 1989 when she resigned the position to work part-time.

She continues as Designated Federal Official to the Radiation Advisory Committee. She prepares HAPPENINGS, a monthly publication of the Science Advisory Board staff.

DR. C. RICHARD COTHERN

Designated Federal Official: Drinking Water Committee

DR. E. RICHARD COTHERN received a BA (Physics and Math) from Miami University (Ohio), a MS (Physics) Yale, and a PhD (Physics) from the University of Manitoba.

Immediately prior to joining SAB in 1987, Dr. Cothorn served as the Agency National Expert on Radioactivity and Risk Assessment in Drinking Water. His earlier activities includes service in the Office of Toxic Substances, Science Advisor to the Ohio Senate Committee on Energy, and appointments an the University of Dayton, Wright-Paterson Air Force Base, and University of Manitoba. He currently maintains a relationship with George Washington University as Associate Professorial Lecturer in Chemistry.

Dr. Cothorn joined the SAB Staff as the then-called Executive Secretary of the Environmental Health Committee in 1986. Under his direction the activity of the Drinking Water Subcommittee grew to such an extent that it become a full standing Committee in FY 90. His principal duty involves servicing the Committee. In addition, he is active in a number of professional organizations, leading local groups and serving on national committees. These activities have allowed him to share his interest and abilities in the area of risk assessment and radiation. Since the Spring of FY 91, Dr. Cothorn has been on a rotational assignment to the Center for Environmental Statistics in the Office of Policy, Planning, and Evaluation.

MR. A. ROBERT FLAAK

Assistant Staff Director Designated Federal Official (DFO) for the Clean Air Scientific Advisory Committee, Indoor Air Quality and Total Human Exposure Committee, and Acting DFO for the Drinking Water Committee.

MR. A. ROBERT FLAAK is the most experienced of the SAB's Designated Federal Officials, having served for six months as the original Executive Secretary for CASAC 1978-1979 and re-occupying that position from 1984 to 1991. He currently serves as the DFO for the Indoor Air Quality/Total Human Exposure Committee, and, since June 1991, has served as the Acting DFO for the Drinking Water Committee. In January, 1990 he assumed the duties of Acting Assistant SAB Staff Director. He was formally appointed as Assistant Staff Director in February 1991.

In between appointments with the SAB, he served for five years with the U.S. Coast Guard Office of Marine Environment and Systems as Senior Environmental Specialist developing and implementing environmental policy and guidance for the preparation of environmental impact statements for bridge construction throughout the United States and its territories.

Prior to his first tour with the SAB, Mr. Flaak served as Staff Marine Biologist with an engineering consulting company where he assisted in the design and coordination of sampling and data analysis for oceanographic surveys. He has also worked as a consulting marine taxonomist for clients, including the National Oceanic Atmospheric Administration, the du Pont Co., Roy F. Weston Inc., and the University of Delaware's College of Marine Studies. These activities reflect his research interest in phytoplankton ecology, bivalve nutrition, and bivalve and invertebrate mariculture.

Mr. Flaak has graduated from Stuyvesant High School in New York City, the City College of New York (BS in zoology), the University of Delaware (MA in marine studies), and Central Michigan University (MA in public administration). He has taken other graduate level environmental and management courses.

His 25 years of military service include three years of active duty with a tour in South Vietnam in 1968-69. He is currently an active US Army Reserve Lieutenant Colonel, serving as the Assistant Chief of Staff-Logistics for a Civil Affairs brigade, part of the 1st Special Operations Command. He was recently called to active duty and served for four months (Jan - May 1991) in Saudi Arabia, Kuwait and Iraq during Operation Desert Storm. He lives with his wife, Dottie, and their six-year old son, Chris in Fairfax, Virginia.

DR. JACK KOOYOOMJIAN

Designated Federal Official for the Environmental Engineering Committee

DR. JACK KOOYOOMJIAN joined the Science Advisory Board (SAB) in July, 1988 as Designated Federal Official of the Environmental Engineering Committee. He brings to his work at the SAB over 22 years of experience with environmental issues, including over 17 years of diverse experience within EPA Headquarters.

In the mid-1970's he worked in the Office of Solid Waste, documenting cases involving the improper disposal of hazardous wastes which contributed to the passage of landmark RCRA in 1976. He also gained experience with saturated and unsaturated zone modeling and ground-water model assessment during this time. He has over four years experience in the Office of Water developing guidelines and regulations for industrial wastewater sources. In 1979, Jack joined the Superfund's Emergency Response program, where he developed the multi-media hazardous substance reportable quantity regulations. He also was responsible for oil and hazardous substance pollution prevention regulations, oil spill reporting, the emergency response data base known as OHMTADS (Oil and Hazardous Materials Technical Assistance Data System), as well as the oil and dispersant testing and registration program (old Subpart H, now Subpart J) of the National Contingency Plan.

Dr. Kooyoomjian received a BS (Mechanical Engineering) from the University of Massachusetts, and a MS (Management Science) and a Ph.D. (Environmental Engineering, with a minor in Economics) from Rensselaer Polytechnic Institute. His academic career included his induction into a number of honorary societies: e.g., Sigma Xi (research), Chi-Epsilon (civil engineering), Omicron Delta Epsilon (economics). His professional activities continue apace. He served as a member of the Board of Control of the Water Pollution Control Federation (WPCF) from 1986 to 1989, and was a member of its Policy Advisory Committee in 1988/1989. In 1988 he received the Arthur Sidney Bedell Award from WPCF for extraordinary personal service in the water pollution control field. He served as Local Arrangements Co-Chair of WPCF's 63rd Conference and Exposition, which was held October 6-11, 1990 in Washington, D.C. and hosted nearly 13,000 registrants. He is also active in the Federal Water Quality Association (FWQA), the local member association of WPCF, where he has served in numerous capacities, including President.

Closer to home, which he shares with his wife Gerry, and their three daughters, Jennifer (17), Melissa (12) and Jessica (10), Dr. Kooyoomjian is involved in numerous civic activities which focus on development and land-use issues in his

area. He received both an EPA Public Service Recognition Award in 1988 and several County Recognition Awards. Most recently he was recognized as a candidate for the Governor's Award for volunteerism for the state of Virginia in 1991.

MR. SAMUEL RONDBERG

Designated Federal Official for the Environmental Health Committee

MR. SAMUEL RONDBERG retired from the Senior Executive Service (SES) in August, 1988 and re-entered federal service in November 1988, when he joined the SAB staff. During his previous full and fruitful career at EPA, he served as an Office Director and Associate Office Director in EPA's Office of Research Development (ORD) and the Office of Information Resources Management (OIRM).

Before joining EPA in 1974, Mr. Rondberg held research management, analytical, and policy formulation positions with the Department of Transportation and the Veterans Administration's Department of Medicine Surgery. He also served in the U. S. Army for two years, with the rank of Captain. Most of his federal career has been devoted to advancing the use of analytic methodologies to address public policy issues, and to improving the management of federal research activities. At EPA, he has directed particular efforts to the complex problems and issues engendered by operating a research program within the context of a regulatory agency--coordination between legal and scientific "cultures"; maintaining a stable long-term program in the face of urgent and frequently changing needs for short-term support; and maintaining an adequate resource base in the face of competition from regulatory programs struggling to meet court or Congressionally mandated deadlines.

Mr. Rondberg pursued undergraduate (AB, 1959) and graduate studies at Washington University, where he also served as a Teaching Assistant in the Graduate School of Arts and Sciences and as a Public Health Service Fellow and Research Associate in the Medical School. In 1967, he was awarded a National Institute of Public Administration Fellowship in Systematic Analysis at Stanford university and completed a special interdisciplinary curriculum in the Schools of Engineering, Graduate Business, and the Departments of Economics and Computer Science.

Mr. Rondberg has authored publications in clinical psychology, research management, and the applications of electronic systems and telemetry to urban transportation.

Sam is married, the father of one graduate student daughter, and attempts to find time to pursue interests in modern history, the impacts of technology on society and culture, amateur radio, marine aquaria keeping, and antique art (posters and advertising graphics) as a reflection of our social history.