



Science Advisory Board FY 1993 Annual Staff Report

Forging Partnerships

Science Advisory Board



ACKNOWLEDGEMENT

This report was prepared by the Staff of the Science Advisory Board. The principal Editors were Edward Bender, Robert Flaak, and Samuel Rondberg.

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Science Advisory Board



FY1993 Annual Staff Report "Forging Partnerships"

This report is a Staff summary of activities for the U.S. Environmental Protection Agency's Science Advisory Board for Fiscal Year 1993, with projections for Fiscal Year 1994. This report has not been reviewed by the Board or the Agency and should not be construed as representing the views of either organization.

DEDICATION

This Annual Report is dedicated to Dr. Raymond C. Loehr who served as Chair of the Executive Committee from 1988-1993. It was his visionary, yet accommodating, leadership style that led the Board into new areas and higher levels of technical advice, while maintaining fruitful and productive relationships with the Agency and the public. Of him it can be truthfully be said, "He is a gentleman and a scholar..."

This Annual Report of the SAB Staff is also dedicated to the memory of Ms. Darlene Sewell, who most recently served as secretary to the Staff Director prior to her untimely and tragic death in January of this year. We like to think that Darlene would approve of our efforts; flashing us one of her winning smiles and giving us a hearty "All right!;" thereby, providing light in the darkness. We all miss her.

FOREWORD

The new EPA Administrator Carol Browner has adopted "forging partnerships" as one of the guiding themes for her tenure at EPA. She calls upon all elements of the Agency to imaginatively seek to expand our influence, input, and impact by joining forces with other groups, both inside and outside the Federal government.

As a unique body that interfaces between the Agency and the public, the Science Advisory Board is a good example of such a fruitful partnership, coupling the work of the outside technical community with the work of technical experts within the Agency. In addition to the fundamental partnership with the Agency, the Board has taken the initiative in exploring and forging additional partnerships inside and outside EPA. Among the examples that can be cited from FY93 are the following:

a) The SAB formed partnerships among its own committees to conduct coordinated reviews of complex issues: e.g., the interrelated work of five committees which is producing six reports on the RCRA Corrective Action RIA.

b) The SAB formed partnerships with other Agency scientific advisory committees; e.g., a joint SAB/FIFRA Scientific Advisory Panel (SAP) review of the epidemiological evidence on the carcinogenicity of 2,4-D.

c) The SAB explored partnerships with other Agency advisory committees; e.g., a joint effort

with EPA's Environmental Financial Advisory Board (EFAB).

d) The SAB explored partnerships with scientific advisory committees in other agencies; e.g., an agreement between the scientific advisory committee for the Agency for Toxic Substances and Disease Registry (ATSDR) and SAB to review issues on lead exposure and toxicity.

e) The SAB formed new partnerships with program offices and Regions to explore new areas; e.g., pursuit of a request from Region 5 and OSWER for review of a highly visible, highly contentious Superfund site in Ohio.

f) The SAB broadened its partnerships with women and minority technical experts; e.g., increasing the number of women SAB members by 2-fold and the number of minority SAB members by 11-fold, to the point that the percentages of women and minorities on the SAB mirror the percentages of women and minorities among the holders of technical PhD degrees in the US.

g) The SAB formed partnerships with Congress; e.g., performing Congressionally mandated reviews of assessment of multi-media risk and cost mitigation for radon.

h) The SAB anticipates partnerships with advisory bodies to other governmental groups due to the fact that the Vice President's National Performance Review, drawing on EPA's experience with the SAB, has called for all science-based agencies to establish outside scientific advisory boards.

FY94 will see the Board forging additional partnerships to respond to continually

The Board has taken the initiative in exploring and forging additional partnerships.....

changing circumstances. As the Board's membership rotational policy becomes fully effective, we anticipate major changes in the Board's leadership. This change will be mirrored by major changes in the Agency as new political appointees take up their positions in the program offices. Finally, FY94 will see the Board conduct its largest study since the

Reducing Risk report in 1990: the Environmental Futures Project. These changes and challenges will require unprecedented coordination and partnerships with the Agency, among the SAB Committees, and outside experts. In many ways, these new partnerships could well lead to a "reinventing of the SAB" in FY94. It certainly won't be dull!

Donald G. Barnes, Ph.D.
Staff Director
November 1993

**THE SCIENCE ADVISORY BOARD:
FORGING PARTNERSHIPS**

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1. EXECUTIVE SUMMARY

1.1 Introduction to the Report

This purpose of this Annual report is to: (a) provide a succinct introduction to the Science Advisory Board (SAB); (b) Provide a summary of the SAB activities for Fiscal Year 1993; and (c) 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, including specific examples of the way the SAB is getting results. Section 4 contains summaries of the activities of each of the SAB Committees during FY93. Examples of the ways that the SAB Staff Office is forging partnerships are included. Section 5 contains some projections for FY94.

The Report also includes a number of specialized appendices: charters, organizational charts, leadership information, membership lists, guidelines on service on the SAB, lists of meetings, abstracts of FY93 reports, and information about the SAB Staff.

1.2 Introduction to the Board

The purpose of the Board is to provide qualified, independent technical advice to the Administrator of EPA on scientific, engineering, and economic underpinnings of Agency positions (See charters in Appendix A). The SAB often functions as a peer review panel, assessing the technical 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 leachability of hazardous wastes and a commentary on the relative risks of radon in drinking water vs radon gas in homes.

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, economists, and engineers appointed by the EPA Administrator. The 95 current Members of the Board (see Appendix B) are appointed by the Administrator and conduct their business through ten standing Committees, coordinated through an Executive Committee (See the organizational chart in Appendix C and Staff Support and Committee Leadership in Appendix E). The members of the Board are some of the most qualified technical experts in the country, as evidenced by the credentials of the FY93 Committee Chairs (See Table II). The work of the Board is supported by over 300 consultants to the Board (see Appendix B), who are also non-governmental scientists, engineers, and economists appointed by the SAB Staff Director. Technical experts employed by the Federal Government who have special skill or knowledge in particular areas participate as Liaisons to several Committees, as needed.

The SAB is supported by a Staff Office of 18 employees and an FY93 budget of some \$1.9 million. These resources enabled the Board to conduct 67 meetings (of which 12 were conference calls) and issue 16 full reports

and 21 short reports (generally less than 10 pages, including Letter Reports and Commentaries) and six Notifications of Consultations (See Tables III and IV).

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, determining the degree to which such requests:

- a) Impact 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, engineering, and economic issues

Of particular note, in terms of the Board's "forging partnerships" and affecting major aspects of EPA's operations in FY93, were:

- a) A review of the Regulatory Impact Assessment for RCRA Corrective Action plans
- b) A reviews of a multi-media risk assessment and the mitigation costs of controlling radon
- c) A review of data collected at the Industrial Excess Landfill in Uniontown, OH

With all of these activities, attention and impacts, the Board has maintained a broad base of support both within and outside the Agency.

1.3 Review of FY93 Activities

During FY93, the ten SAB Standing Committees conducted 54 public meetings and one closed meeting, all of which were announced in the Federal Register. In addition, twelve public conference calls were held for planning, writing, and discussion purposes. A wide variety of topics were covered: from the health effects of specific chemicals to techniques for assessing risks at Superfund sites; from aspects of the Agency's research program to various reports to Congress. Appendices F and G contain a full listing of FY93 SAB meetings and reports (with abstracts), respectively.

In addition to its traditional activities of holding SAB meetings and producing reports, the Board and the SAB Staff took steps to develop ways of "forging partnerships" by expanding and improving the infrastructure that enables the Board to do its work. These include the following:

- a) Continued implementation of the recommendations of the Mission and Functioning report that was received in October, 1989.
- b) Expanding our communications networks, through our Local Area Network (LAN) and through INTERNET.
- 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 proce-

dures 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.

- e) Increasing the number of professional staff.

The Board itself forged several new partnerships in FY93. First, the SAB has been engaged and briefed by a new Administrator with particular visions for the Agency and the role of the SAB. The new Environmental Economics Advisory Committee (EEAC) has become a partner for many of the Standing Committees in the review of the RCRA-RIA. The Executive Committee took an active role in coordinating these partnerships through a series of ad hoc Committees established to oversee reviews that drew on interdisciplinary expertise from the Science Advisory Board.

1.4 Projections and Conclusions

FY94 should be an exciting and busy time for the SAB. There will be several activities associated with completing tasks started in FY93, as well as a range of on-going efforts related to the Environmental Futures project and the arrival of a new management team in the program offices with fresh perspectives on the priorities for the Agency.

The FY94 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 Agency's reassessment of the risks posed by "dioxin", water quality criteria, assessing radon research needs, and the Environmental Futures Project. In addition, as in the past, FY94 is likely to bring a number of important topics that cannot be anticipated at this time.

FY94 promises to be a period of high activity for the Staff Office. As the new Administration fills its ranks and sets its course, the Staff Office will respond to new initiatives such as the Environmental Futures project and more time will be committed to follow up on the responses of the Agency to SAB recommendations.

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 (EPA) 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 flip-pant, 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 Annual Report of the Science Advisory Board Staff is three-fold:

- a) To provide a succinct introduction to the SAB.
- b) To provide a summary of the SAB activities for FY93.
- 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 supplementing 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 FY93. 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 FY93 was a year of "Forging Partnerships". In addition, changes in the SAB Staff assignments and operations of the Office are highlighted. Section 5 provides a glimpse into what FY94 holds in store for the Board. Significant topics have already been identified some reviews are underway and others are planned; and additional issues will arise during the course of the year.

The Appendices contain important information, such as organizational charts, membership lists, abstracts of SAB reports, and the like. These Appendices 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 SAB was established by Congress to provide independent scientific and engineering advice to the EPA Administrator 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 issues (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 biennially, 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 scientists, engineers, and economists 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 (See Appendix B for a listing of Members and Consultants).

Increasingly, the Agency has placed a premium on basing its regulations on a solid technical foundation. Therefore, during the past 15 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.

Generally, the Board functions as a technical 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 [and now economists] 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 C contains a chart of the FY93 SAB organization. The Executive Committee meets four times a year to act on Agency requests for reviews, to hear briefings on pertinent issues, to initiate actions/reviews by the Board which it feels are appropriate, and

to approve final reports prior to transmittal to the Administrator. (Reports from CASAC and the new separately chartered CAACAC are submitted directly to the Administrator, without need for prior Executive Committee approval.)

Five Committees have historically conducted most Science Advisory Board reviews:

a) Clean Air Scientific Advisory Committee (CASAC)

b) Ecological Processes and Effects Committee (EPEC)

c) Environmental Engineering Committee (EEC)

d) Environmental Health Committee (EHC)

e) Radiation Advisory Committee (RAC)

In recent years, five additional committees have been added:

f) Indoor Air Quality/Total Human Exposure Committee (IAQC): Mandated in the Superfund Amendments and Reauthorization Act in FY86

g) Research Strategies Advisory Committee (RSAC): Requested by the Administrator in response to SAB recommendations in FY88

h. Drinking Water Committee (DWC): Evolved from the EHC in FY90

- i) Clean Air Act Compliance Analysis Council (CAACAC): Mandated in the 1990 Clean Air Act Amendments
- j) Environmental Economics Advisory Committee (EEAC): Requested by the Administrator in response to the Reducing Risk report in FY90

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

The Board has been successful in tapping a continuing vein of top technical talent to fill its leadership positions. Those scientists

and engineers who have led the SAB (and predecessor organizations) for the past 19 years are listed in Table I. Table II testifies to the caliber of individuals who have served as chairs of SAB Committees in FY93.

Although the number of appointed members is flexible, the FY93 SAB consisted of nearly 100 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 FY93 and FY94 appointments (See Appendix D).

TABLE I SAB Leadership Over the Past Two Decades

Executive Committee Chairs	Affiliation	Dates
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	1988-1993*

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

*Dr. Loehr's term was extended through October, 1993, since the selection of a new chair had not been completed

More than 300 additional technical experts, 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 technical expertise as do the Members. The term "Member or Consultants "(M/C)" is used throughout this report to refer to these outside technical experts. Appendix B contains a list of the FY93 M/Cs on the Board. Nearly all of them serve as "Special Government Employees (SGEs), subject to all appropriate restrictions, including conflict of interest statutes (18 U.S.C. Sections 202-209)

The SAB Staff consists of 18 EPA employees: a Staff Director, Assistant Staff Director, seven scientist/engineer Designated Federal Officers (DFOs), and nine support staff.

The duties of the Staff include identifying potential issues for SAB attention, focusing questions for review by the Board, working with the Board to identify and enlist appropriate Members and Consultants, 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 E contains information on the Staff support within each of the Committees.

TABLE II FY 1993 SAB Committee Chairs

Executive Committee (EC)***Dr. Raymond Loehr***

H.M. Alharthy Centennial Chair and Professor, Civil Engineering at the University of Texas at Austin

Member, National Academy of Engineering

Member, Society of Environmental Toxicology and Chemistry

Member, Water Pollution Control Federation

Member, American Society of Civil Engineers

Former Chair, SAB Environmental Engineering Committee

Clean Air Act Compliance Analysis Council (CAACAC)***Dr. Richard Schmalensee***

Director, Center for Energy and Environmental Policy Research, Massachusetts Institute of Technology

Member, Editorial Board, Journal of Economics and Management Strategy

Member, Board of Directors, Long Island Lighting Company

Associate Editor, Journal of Economic Perspectives

Fellow, Econometric Society

TABLE II (Continued)

Clean Air Scientific Advisory Committee (CASAC)

Dr. George Wolff

Principal Scientist, General Motors Environmental and Energy Staff
Fellow, Air and Waste management Association
Member, American Meteorology Association
Vice Chairman, Editorial Review Board, Journal of the Air and Waste Management Association
Adjunct Professor, University of Michigan, School of Public Health

Drinking Water Committee (DWC)

Dr. Verne A. Ray

Assistant Director of Safety Evaluation Department, Pfizer, Inc.
Member, Society of Toxicology
Member, Environmental Mutagen Society
Member, Genetic Toxicology Association

Environmental Economics Advisory Committee (EEAC)

Dr. Allen V. Kneese (Co-Chair)

Senior Fellow, Quality of the Environment Division, Resources for the Future
Member, American Academy of Arts and Sciences
Fellow, American Association for the Advancement of Science
Member, American Economic Association
Member, Association of Environmental and Resource Economics
Member, Editorial Board, Journal of Ecological Economics

Dr. V. Kerry Smith (Co-Chair)

University Professor of Economics, North Carolina State University
Member, American Economic Association
Member, Association of Environmental and Resource Economics
Editor, Advances in Applied Macroeconomics
Associate Editor, Journal of Risk and Uncertainty
Associate Editor, Review of Economics and Statistics

Environmental Engineering Committee (EEC)

Mr. Richard Conway

Senior Corporate Fellow, Union Carbide Corporation
Member, National Academy of Engineering
Diplomate, American Academy of Environmental Engineering
Fellow, American Society of Civil Engineers
Member, National Research Council Commission on Engineering and Technical Systems

TABLE II (Continued)

Ecological Processes and Effects Committee (EPEC)***Dr. Kenneth L. Dickson,***

Director, Institute of Applied Science and Dept. of Biological Science.,
University of North Texas

Member, American Fisheries Society

Member, Society of Environmental Toxicology and Chemistry

Member, North American Benthological Society

Member, J. K. G. Silvey Society

Environmental Health Committee (EHC)***Dr. Arthur Upton***

Professor Emeritus, University of New Mexico

Member, American Association for Cancer Research

Member, Association of Pathologists and Bacteriologists

Member, American College of Toxicology

Member, American Society for Experimental Pathology

Member, Radiation Research Society

Member, Society for Experimental Biology & Medicine

Indoor Air Quality/Total Human Exposure Committee (IAQC)***Dr. Morton Lippmann***

Professor, Institute of Environmental Medicine, New York University

Director, Aerosol Inhalation Research Laboratory

Member, American Conference of Government Industrial Hygienists

Member, American Academy of Industrial Hygiene

Member, American Industrial Hygiene Association

Member, American Thoracic Society

Radiation Advisory Committee (RAC)***Dr. Genevieve Matanowski***

Professor of Epidemiology, John Hopkins University

American Association for the Advancement of Science

American Public Health Association

Society for Epidemiological Research

International Epidemiological Association

Research Strategies Advisory Committee (RSAC)***Dr. Roger McClellan***

President of the Chemical Industry Institute of Toxicology

Member, National Institute of Medicine

Member, American Veterinary Medical Association

Member, Radiation Research Society

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.

Most of the outputs of the Board are in the form of full reports.

Such reports are generally the result of the peer review of some Agency document(s) and go into the details

of the findings and recommendations, as well as answering specific questions in the Charge to the Board.

Increasingly, the SAB has moved toward using shorter, more timely communications to the Administrator. These communica-

tions are of two forms: letter reports and consultations. Letter reports are similar in origin, content, and purpose to full reports; simply shorter; commentaries are unsolicited SAB advice about technical issues that the Board feels should be drawn to the Administrators attention.

In addition, in recent years the SAB has introduced the "consultation" as a means of conferring--in public session--with the Agency on a technical matter before the Agency has begun work on an issue. The goal of the consultation is to leaven EPA's thinking on an issue by brainstorming a variety of approaches

to the problem. There is no attempt or intent to express an SAB consensus or generate an SAB report.

The Board simply noti-

fies the Administrator that such a consultation has taken place.

The magnitude of SAB activity has increased dramatically during the past 10 years. Tables III - VI provide summary information on the Board's activities and resources as a whole.

The magnitude of SAB activity has increased dramatically during the past 10 years.

TABLE III SAB Expenses for Fiscal Years 1989-1993

Fiscal Year	Compensation		Travel Expenses	Other	TOTAL
	Staff	M/C			
1989	710	450	270	140	1,570
1990 ¹	750	390	210	320	1,670
1991	778	459	329	162	1,728
1992	894	413	298	54	1,659
1993 ²	1000	450	313	151	1,914

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.

² Estimated

TABLE IV SAB Activities and Resources, Fiscal Years 1980-1993

	Committee Meetings			Reports			Staff		Operating Costs ^f
	Open ^a	Closed ^a	Other ^b	Full ^c	Ltr ^d	Total ^e	Members	FTEs	
1980	42	1	0			13	81	15.8	900
1981	12	1	0			10	72	13.2	750
1982	20	0				10	37	10.5	600
1983	38	1	0			11	44	9.1	650
1984	29	1	0			17	48	14.1	1,050
1985	60	1	0			41	60	14.0	1,200
1986	61	1	0			28	59	14.1	1,200
1987	57	1	0			36	74	14.1	1,350
1988	58	1	0			43	74	13.2	1,400
1989	67	1	0			38	61	14.9	1,550
1990	60	1	5	26 ^g	7	33	55	16.0	1,650
1991	47	1	7	16	6	22	62	16.6	1,750
1992	47	1	2	26	35	61	80	16.5	1,650
1993	54	1	22 ^h	16	21	37	95	18.0	1,900

a Meetings announced in the Federal Register, per the Federal Advisory Committee Act.

b Writing, planning, and administrative sessions do not normally require notice in the Federal Register. Some include conference calls. Data on such sessions prior to 1990 are not available.

c 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.

d A letter report is a more focused discussion of a topic. Included in this category are Letter Reports, and Commentaries to the Administrator on issues of concern to the SAB.

e Appendix G contains a list of all FY93 reports and abstracts.

f Operating costs in thousands (\$000), rounded to nearest \$50K.

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

h Includes 12 conference call meetings that were open to the public.

TABLE V SAB Activities by Committee for Fiscal Years 1989-1993

Committee	Fiscal Year	# Meetings ¹			# Reports ²		
		F.R.	Other	Total	Full	Ltr	Total
EC	1989	4		4			0
	1990	4	0	4	0	0	0
	1991	4	1	5	1	0	1
	1992	4	1	5	0	0	0
	1993	4	1	5	0	0	0

TABLE V SAB Activities by Committee for Fiscal Years 1989-1992 (Continued)

Committee	Fiscal Year	# Meetings ¹			# Reports ²		
		F.R.	Other	Total	Full	Ltr	Total
EC/ ad hoc	1989			20			5
	1990	18	6	24 ³	7	0	7
	1991	0	0	0	0	0	0
	1992	0	0	0	0	1	1
	1993	8	5	13	0	2	2
CAACAC	1992	1	0	1	0	1	1
	1993	3	0	3	0	3	3
CASAC	1989			8			6
	1990	1	0	1	1	2	3
	1991	1	0	1	2	0	2
	1992	3	0	3	0	4	4
	1993	3	1	4	0	3	3
DWC	1990	4	0	4	3	2	5
	1991	8	0	8	2	0	2
	1992	5	0	5	4	8	12
	1993	6	1	7	4 ⁵	2	6
EEAC	1992	2	0	2	0	1	1
	1993	4	0	4	0	1	1
EEC	1989			11			3
	1990	8	0	8	4	0	4
	1991	7	1	8	2	1	3
	1992	7	1	8	3	4	7
	1993	8	1	9	4	3	7
EHC	1989			9			13
	1990	3	0	3	5	0	5
	1991	4	0	4	3	4	7
	1992	2	0	2	2	1	3
	1993	2	1	3	3	0	3
EPEC	1989			7			3
	1990	6	0	6	3	0	3
	1991	10	0	10	4	0	4
	1992	9	1	10	8	3	11
	1993	7	1	8	2 ⁵	2	4

TABLE V SAB Activities by Committee for Fiscal Years 1989-1992 (Continued)

<u>Committee</u>	<u>Fiscal Year</u>	# Meetings ¹			# Reports ²		
		<u>F.R.</u>	<u>Other</u>	<u>Total</u>	<u>Full</u>	<u>Ltr</u>	<u>Total</u>
IAQC	1989			2			1
	1990	0	0	0	0	1	1
	1991	2	0	2	1	0	1
	1992	3	0	3	2	2	4
	1993	1	0	1	1	2	3
RAC	1989			2			3
	1990	12	0	12	0	1	1
	1991	8	2	10	0	1	1
	1992	7	0	7	4	10	14
	1993	7	11	18	2	3	5
RSAC	1989			4			4
	1990	2	0	2	3	0	3
	1991	3	0	1	2	0	1
	1992	4	0	4	3	0	3
	1993	1	0	1	1	1	2

Where

EC Executive Committee
 CAACAC Clean Air Act Compliance Analysis Council
 CASAC Clean Air Scientific Advisory Committee
 DWC Drinking Water Committee
 EEAC Environmental Economics Advisory 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

RSAC Research Strategies Advisory Committee

¹ For FY 90 and later indicates meetings requiring notice in Federal Register and those not requiring notice.² In 1990 and later, reports are entered as Full reports, or Letter reports (which include commentaries).³ Includes 22 meetings of the Relative Risk Reduction Strategies Committee (RRRSC)⁴ Includes four planning sessions not listed in the Federal Register⁵ Counts the same report (EPA-SAB-EPEC/DWC-93-005) twice.

TABLE VI Time to Completion Analysis for Reports and Letter Reports

Document Title and (Document Number)	Cmte	Date of Last Meeting	Processing Time (days)		
			Review	Approval	Total (days/months)
REPORTS:					
Superfund RAGS EPA-SAB-EHC-93-007	EHC	Apr 1992	297	25	322/10.7
HERL R&D Program EPA-SAB-DWC-93-001	DWC	Dec 1991	316	1	317/10.6
Carbon-14 (High Level Waste) EPA-SAB-RAC-93-010	RAC	Sep 1992	259	33	292/9.7
UST Research Program EPA-SAB-EEC-93-008	EEC	Jun 1992	247	32	279/9.3
Indoor Air Research Program EPA-SAB-EEC-93-009	EEC	Jul 1992	227	32	259/8.6
Ambient Water Quality EPA-SAB-DWC-93-016	DWC	Feb 1993	162	76	238/7.9
Great Lakes WQI EPA-SAB-93-EPEC/DWC-005	EPEC/DWC	Jun 1992	144	53	197/6.5
Dermal Exposure Assessment EPA-SAB-EHC-93-006	EHC	Aug 1992	165	17	182/6.1
Cholinesterase Innibition EPA-SAB-EHC-93-011	EHC	Nov 1992	170	1	171/5.7
Hydrogen Flouride EPA-SAB-EEC-93-004	EEC	Jul 1992	106	57	163/5.4
Groundwater Models EPA-SAB-EEC-93-013	EEC	Jan 1993	99	59	158/5.3
Sediment Criteria EPA-SAB-EPEC-93-002	EPEC	Jun 1992	133	17	150/5.0
Radon Cost Engineering EPA-SAB-DWC-93-015	DWC	Feb 1993	64	77	141/4.7
Environmental Tobacco Smoke EPA-SAB-IAQC-93-003	IAQC	Jul 1992	92	31	123/4.1
Achievement Awards EPA-SAB-RSAC-93-012	RSAC	Mar 1993	51	3	54/1.8
Radon Uncertainty Study EPA-SAB-RAC-93-014	RAC	Feb 1993	64	76	140/4.7

AVERAGE REPORT COMPLETION TIME: 198 DAYS, OR 6.6 MONTHS

TABLE VI Time to Completion Analysis for Reports and Letter Reports (Continued)

Document Title and (Document Number)	Cmte	Date of Last Meeting	Processing Time (days)		
			Review	Approval	Total (days/months)
LETTER REPORTS:					
Social Science Research Agenda EPA-SAB-RSAC-LTR-93-001	RSAC	Jan 1992	273	1	274/9.1
VOC Contaminants in Water EPA-SAB-IAQC-LTR-93-002	IAQC	Feb 1992	240	9	249/8.3
Gasoline Vapors in Buildings EPA-SAB-IAQC-LTR-93-003	IAQC	Feb 1992	240	9	249/8.3
Health-Health EPA-SAB-EEAC-LTR-93-005	EEAC	Jul 1992	199	36	235/7.8
Biotechnology Research Plan EPA-SAB-EPEC-LTR-93-012	EPEC	Feb 1993	153	21	174/5.8
Superfund GW Remediation EPA-SAB-EEC-LTR-93-009	EEC	Mar 1993	141	2	143/4.8
Modeling Peer Review EPA-SAB-EEC-LTR-93-008	EEC	Mar 1993	51	76	127/4.2
Radiogenic Cancer Risk EPA-SAB-RAC-LTR-93-004	RAC	Aug 1992	77	50	127/4.2
Clean Air Act Impacts EPA-SAB-CAACAC-LTR-93-006	CAACAC	Dec 1992	38	56	94/3.1
Alternative Fuels EPA-SAB-CASAC-LTR-93-014	CASAC	Jun 1993	93	1	94/3.1
Oxides of Nitrogen EPA-SAB-CASAC-LTR-93-015	CASAC	Jul 1993	91	1	93/3.1
Global Climate Change EPA-SAB-EEC-LTR-93-013	EEC	May 1993	56	22	78/2.6
Clean Air Act Impacts Study EPA-SAB-CAACAC-LTR-93-007	CAACAC	Mar 1993	30	21	51/1.7
Prospective Study CAA EPA-SAB-CAACAC-LTR-93-015	CAACAC	Jun 1993	56	1	57/1.9
Radon Multimedia Risk EPA-SAB-EC-LTR-93-010	EC	Jul 1993	1	8	9/0.3

AVERAGE LETTER REPORT COMPLETION TIME: 137 DAYS, OR 4.9 MONTHS

AVERAGE COMPLETION TIME FOR ALL ADVISORY DOCUMENTS: 169 DAYS, OR 5.6 MONTHS

NB Reports listed in descending order of time to completion within category; "Review" = time between last meeting and Executive Committee Approval; "Approval" = time between Executive Committee approval and transmission to the Administrator; "Month" defined as 30 days.

From FY90 to FY91 there was a decrease in the number of meetings and reports. This decline resulted from several factors including an increase in complexity of the Board's review topics, and in the degree of public interest, scrutiny and involvement. Also during this period of increasing workload, several staff members were lost to other worthy activities. In FY93, fewer reports were completed, but the number of meetings and the level of funding increased slightly. These changes are the result of staff transitions, the pursuit of complex topics by several committees (e.g., the RCRA-RIA and the Environmental Futures Project), the increased number of consultations with the Agency, and investments in new partnerships within the Agency and with the public.

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 overall environmental protection;
e.g., the Great Lakes Initiative (EPA-SAB-EPEC/DWC-93-005)
- b) Address novel scientific problems or principles;
e.g., the Framework for Groundwater Model application (EPA-SAB-EEC-93-013).
- c) Integrate science into Agency actions in new ways;
e.g., review of the Social Science Research agenda (EPA-SAB-RSAC-LTR-93-001) and Dermal Exposure Assessment (EPA-SAB-EHC-93-006).
- d) Influence long-term technological development;
e.g., Indoor air engineering (EPA-SAB-EEC-93-009)
- e) Respond to emergencies; (None in FY93)
- f) Deal with problems that transcend federal agency or other organizational boundaries;
e.g., review of environmental tobacco smoke risk assessment (EPA-SAB-IAQC-93-003)
- g) Strengthen the Agency's basic capabilities;
e.g., the review of the Superfund Site Health Risk Assessment guidelines (EPA-SAB-EHC-93-007)
- h) Serve Congressional and other leadership interests;
e.g., reviews of radon multimedia risks and cost estimates for radon treatment of drinking water required by the Chafee-Lautenberg amendment to the drinking water appropriation (EPA-SAB-RAC-93-014, EPA-SAB-DWC-93-015, and EPA-SAB-EC-LTR-93-010).

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 the impacts of some of these activities during FY93.

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

Two committees, the Ecological Processes and Effects Committee and the Drinking Water Committee reviewed guidance for the Great Lakes Water Quality Initiative (EPA-SAB-EPEC/DWC-93-005). The initiative was a combination of EPA regions, states, the private sector and the scientific community in the region. The guidance included two tiers of criteria to protect aquatic life, wildlife, and human health. The SAB recommended that the program consider using the biologically active form and the total contaminant concentration when establishing water quality criteria, that the focus on wildlife be expanded to include protection of sensitive species in addition to human consumers of the wildlife, and that significant improvements be made in the analysis and presentation of data for human health risk assessment. The draft guidance has been revised and will be presented to the SAB later in FY94.

b) Impacts on expenditures of funds

The SAB recommended that the Agency increase its funding for coastal and marine protection and research (EPA-SAB-EPEC-

COM-93-005), reminding the Agency that anthropogenic activities are posing major threats to these ecological sensitive areas. In a commentary on Radon Science Research, the Radiation Advisory Committee (EPA-SAB-RAC-COM-93-001) noted that additional research on mitigation of radon risk was being canceled in spite of its high potential for substantial risk reduction. This commentary prompted further dialogue and discussion such that the Agency is reevaluating that decision. Finally, the SAB noted that engineering mitigation for global climate change was a useful and productive program with very little funding. The initial response of the Agency was to eliminate this as a small program. However, due to a new Administration initiative, the Agency will increase its emphasis on Global Climate Change issue. Therefore, it is possible that this research program may be reinstated.

c) Impacts on emerging science policy

Although it is the intent of the SAB to limit its advice to scientific issues, there are many policy implications associated with their advice. The SAB completed a detailed review of "Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders" (EPA-SAB-IAQC-93-003) in which the SAB supported the Agency's designation of ETS as an EPA Class A carcinogen in the face of strong public comments and debate. The weight of the evidence and the care of the analysis will offer strong support to the Agency's policy initiatives to curb smoking.

The SAB and the FIFRA Scientific Advisory Panel (SAP), meeting jointly, conducted a review of the risks of cholinesterase

inhibitors (EPA-SAB-EHC-93-011). The combined panel recommended that EPA's policy continue to include the use of blood cholinesterase data in the risk assessment process as a biomarker of exposure. These measurements required by certain pesticide manufacturer have long been criticized as unnecessary and misleading. The SAB recommendations clarify the relevance of the data and identify new paths for the Agency to investigate its correlations with effects.

d) Impacts on Agency planning

The SAB reviewed a variety of issues related to the retrospective and prospective analysis of the Clean Air Act impact studies required by section 812 of the CAA amendments (EPA-SAB-CAACAC-LTR-93-006 and EPA-SAB-CAACAC-LTR-93-007). The Council urged EPA to develop methods to deal with a broad range of important toxic emissions that are not carcinogens and to develop and apply the methods necessary for an analysis based on measures of central tendency, not 95% upper bound limits. The Council also advised the Agency to take full advantage of existing research on lead. Such analyses could be used to either corroborate or correct estimates of the value of a statistical life derived from hedonic wage studies. These and other comments from the CAACAC helped the Agency to set research priorities and improve its analysis for Congress.

The SAB also commented on the Agency's guidance for Peer Review of Environmental Regulatory Modeling (EPA-SAB-EEC-LTR-93-008), a process which was formalized in response to an earlier SAB recommendation.

The major recommendation was to add a discussion of how the Agency would track, respond to, and formally use comments from peer reviewers in developing a final Agency model.

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

The SAB has been a major contributor to public debate on a number of issues during FY93. As noted elsewhere, reviews on ETS and Radon have included vigorous public comments. Another project which continues into FY94 is the review of the monitoring data and quality control procedures used by EPA at the Industrial Excess Landfill Superfund site in Ohio. This site-specific review is the first such activity by the SAB. It has been an important source of new experience for the SAB members and the staff. Finally, the SAB has been the focus of many discussion about the role of advisory committees within the Agency and the distinctions between science and policy.

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 FY93. 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, the national ambient air quality standard for ozone and other photochemical oxidants, 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. This year's ETS review again drew close scrutiny from Capitol Hill as Administrator Browner and Dr. Mort Lippmann, Chair of the SAB review Committee, testified before a house committee. In

addition, the Subcommittee on Natural Resources, Agriculture Research and Environment, which over-

sees 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, Congressman George Brown has indicated an interest in reviewing the history and current status of the SAB. He wants to compare what Congress had envisioned for the SAB when they formed it in 1978, with what it has become. He may address this issue in hearings on science at EPA, tentatively scheduled for the spring of 1994.

Vice President Gore undertook a critical examination of the Federal Government operations in FY93, issuing a formal report of his National Performance Review (NPR). One of the recommendations in the NPR is that science-related agencies should have science advisory boards. This recommendation stemmed, in part, from his review of the success of the SAB in the context of EPA.

SAB reports and commentaries also contributed to Congressional directives in the FY93 appropriations bill for the Agency. Specifically, EPA was required to conduct multimedia risk assessments and comparative cost/benefit studies for radon gas and complete a study of the cost/benefits of drinking water regulations by mid-summer of 1993. These reports were submitted to the SAB for review prior to submission to the Congress. The

review prompted a US Senator to write the Board expressing concern about the SAB's apparent movement into the policy arena.

Dr. Loehr responded on behalf of the SAB, articulating the Board's traditional position on the separation of risk assessment and risk management, and how it applied in this case.

Support for the SAB both inside and outside the Agency remains strong.

3.4 Examples of the SAB's "Forging Partnerships"

3.4.1 Regulatory Impact Analysis for RCRA--Forging Partnerships within the Board

The review of the Regulatory Impact Analysis (RIA) for Corrective Action plans under the Resource Conservation and Recovery Act (RCRA) involved a major partnership between four Standing Committees and an ad hoc Steering Committee of the Executive Committee. The initial request for review in October 1992, was narrowly focused on the review of a contingent valuation (CV) method by EEAC that EPA had applied to quantify the benefits of protecting groundwater resources that were not currently used. The SAB found that many assumptions used in the application of this method were imbedded in the model for pollutant transfer and the health and ecological risk assessments for the sites. Consequently, the Board negotiated with the Agency to expand the charge for the review to include these concerns, thereby calling the EEC, the EHC, and the EPEC into the activity. The Steering Committee was formed to coordinate the different views.

It is interesting to note that each year EPA performs a large number of RIAs on its major legislation. Yet this was the first time the SAB has reviewed the technical approach to estimating the benefits and risks for an RIA.

This review by the SAB provided many insights to the Agency for improving the technical basis for the assessment of benefits and costs here and in general. A fundamental recommendation from the partners was that the

Agency should consider seeking advice early on when it is contemplating innovative approaches which push the frontiers of science, such as the contingent valuation method they applied to establish non-use values for groundwater.

3.4.2 Multimedia Risks of Radon--Forging Partnerships within the Board and with Congress

The risks and mitigation measures for radon have been a major theme for the Radiation Advisory Committee in recent. In the past, airborne radon has been the major focus. This year, a Senate amendment, (the Chafee-Lautenberg Amendment) to an appropriations bill explicitly directed the SAB to review EPA's study of the costs and risks associated with radon mitigation before EPA promulgated final drinking water standards for radionuclides.

The Radiation Advisory Committee reviewed the uncertainty analysis for the Agency's risk assessment and the Drinking Water Committee reviewed the mitigation technologies and costs. An Agency report to Congress based on these earlier studies was reviewed by a steering committee which compared the relative risk associated with radon in indoor air and that from drinking water sources.

In their view, the Agency was proposing regulation that would cost hundreds of millions of dollars to address a problem (radon in drinking water) that constituted only about 1% of the total radon risk in the country. The Agency was not addressing any of the risk from radon soil gas in homes which accounts for 99% of the estimated risk. In fact, the radon risk in water was only about 10% of the

radon risk posed by ambient air.

The Steering Committee recommended that EPA raise its standard for drinking water and reassess the data on the risks and extent of the population exposed, in view of its level of uncertainty, and the cost for mitigation, in comparison with the higher levels of risk and exposure associated with radon gas.

The implications of the recommendations were discussed extensively in debate on Capitol Hill, around EPA, and in the press. These discussions highlighted concern for the perennial question of the separation of risk assessment and risk management on a given issue and the role of the SAB. In particular, the SAB Chair received a letter from a US Senator raising concerns about the propriety of the Board's report. Dr. Loehr responded by describing the guiding principles of Board conduct and their application to this case. These events and the underlying question were the subject of a news story in Science magazine.

3.4.3 Industrial Excess Landfill (IEL)-- Forging Partnerships with Regions and Localities

In response to a request from the Agency's Office of Solid Waste and Emergency Response (OSWER), the Science Advisory Board formed an *ad hoc* subcommittee of the Executive Committee to conduct a review of issues related to screening procedures and evaluation criteria for radioactive contamination at Superfund sites. Although the Board does not normally undertake reviews of site-specific issues, in this case the Board agreed to examine the general issue in the context of a specif-

ic Superfund site where sub-surface radioactive contamination may be present: the Industrial Excess Landfill (IEL) Superfund site in Uniontown, Ohio.

Citizens residing near the IEL site are concerned that radioactive wastes had been illegally discarded at the site. Following citizen complaints, an independent evaluation of the Agency's investigation and cleanup lead to a recommendation that the SAB become involved.

Although the project has not yet been completed, the SAB has been working closely with EPA Regional personnel who have had primary responsibility of the site over the years. In addition, the Board has been in communication with a group of concerned citizens living near the site and their technical representatives, in order to ensure that all of the relevant data and questions are available during the review.

To date, there has been an exploratory visit to the site (by Subcommittee leadership), a public meeting in Ohio (July 20-21, 1993), and a public meeting in Washington, D.C. (September 21-22, 1993). A final public meeting will be conducted by the end of calendar 1993, probably in Ohio. In addition, there have been numerous telephone contacts between the SAB Staff, concerned citizens, and their representatives in Congress.

3.4.4 Environmental Futures Project-- Forging Partnerships with the Agency, within the Board, and with the Future

At the July, 1993 meeting of the Executive Committee EPA Administrator Carol

Browner and David Gardiner, Assistant Administrator for the Office of Policy, Planning, and Evaluation (OPPE), asked the SAB to undertake an initiative on Environmental Futures. The project is considered by EPA to be a logical extension of the SAB report on "Reducing Risks", in which the SAB suggested that the ability to anticipate and address the future potential risks of emerging problems would be a closely tied to improving the data collection and analytical procedures which are the basis for assessment, comparison, and reduction of different environmental risks. EPA believes that it needs to develop a procedure for conducting a periodic scan of societal and environmental trends and identifying those which may cause significant impacts on environmental quality or public health.

The Environmental Futures Project is a major undertaking for the SAB that will require adjustments in the workloads of its Standing Committees and perhaps supplementation of the existing support staff resources. In order to coordinate the combined efforts of all the committees, the Executive Committee has established the Environmental Futures Committee as a steering group. The EFC, composed largely of Executive Committee members, plans to meet regularly to develop a package of background materials and premises for the Standing Committees, to coordinate and integrate inputs from the Standing Committees, and to develop the methodology for the detailed evaluation of future problems. As part of its education on forecasting methods, the EFC will interview professional "futurists" from industry, environmental groups, and other research foundations at its regular meetings. The Board will obtain background materials

and additional staff support for these meetings from OPPE staff.

Beginning with a kick-off at the Annual SAB Membership Meeting in October, 1993, each of the 10 Standing Committees is pursuing its individual approach to the problem during the first two quarters of FY94. Their assignment is to identify a list of future developments within the social and physical spheres that are likely to have large effects on environmental quality and the nation's ability to protect the environment. The list will be accompanied by a discussion of the premises, methods, and resources that the committee used to develop its list. In addition, a few Committees may conduct detailed analysis of problems to illustrate the application of one or more methods of forecasting future environmental conditions.

4. REVIEW OF FY93 ACTIVITIES

4.1 Introduction

Even more than last year, FY93 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 FY93 Annual Report consists of a brief overview of SAB Committee

activities 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 FY93, the various Committees and Subcommittees of the SAB conducted 54 public meetings, one closed meeting, and 12 public conference calls and issued 16 full reports and 21 letter-size reports (generally under 10 pages) and six notifications of consultations. Some of these reports reflected culmination of work initiated in the previous fiscal year, just as some of the FY93 meetings will result in FY94 reports.

The SAB was involved in some way with nearly every program office of the Agency. The SAB both responded to requests for reviews from the Agency and took the initiative in delving into new areas and new approaches, providing the kind of technical advice that makes a difference in the Agency's operations.

The activities of the individual Committees are summarized in the sections below. More details are available in the Appendices; specifically, Appendix F contains a list of all SAB meetings and Appendix G contains a list of all FY93 SAB reports, together with their abstracts.

4.2.1 Executive Committee (EC)

In FY93 the Executive Committee was active well beyond its four quarterly meetings. Much of the activity was directed at exploring new partnerships and new interactions to address additional science-related issues facing the Agency.

This broadened range of activity was anticipated by the EC-coordinated FY93 Annual Membership Meeting which focused on the topic: "The Role of the Science Advisory Board". On the program for that meeting was the Vice Chair of the Environmental Financial Advisory Board (EFAB), who announced a collaborative effort between EFAB and SAB leaders to explore providing joint, rather than separate, advice on topics that have both scientific and financial components. Specifically, the groups examined the interface between the selection of environmental risk reduction options and financing those options. While this exploration in partnership building fell short of generating a specific report, it did develop mutual understandings and relationships that could serve the Board and the Agency in the future.

As noted below, four different SAB committees (EEAC, EEC, EHC, and EPEC) were active in forming a partnership to examine aspects of the Agency's regulatory impact analysis (RIA) of the RCRA Corrective Action rule. Given the breadth and the complexity of the issues involved, the EC established a RCRA-RIA Steering Committee to coordinate the SAB's activities and response, including generation of a synthesizing overview report--all of which will be transmitted to the Agency in early FY94. [See Section 3.4.1]

In FY93 the Board was placed in a partnership with Congress when it was explicitly charged, via legislation, to review and comment on aspects of the Agency's multi-media assessment of risks posed by radon and associated remediation costs. The EC established a Steering Committee to coordinate aspects of the review by two different committees and to

prepare an overview report. Under a significant time constraint the Board met the schedule and submitted a report, which engendered a cautionary letter from a US Senator (subsequently responded to by the EC Chair) and a follow up article in Science magazine. [See Section 3.4.2]

The EC continued its FY92 effort to provide assistance to the Superfund Office by investigating site-specific issues at the Industrial Excess Landfill Site in Uniontown, OH. This activity is part of the Board's attempt to determine whether and how it might form partnerships with the Program Offices, Regional Offices, and the public in resolving technical issues in site-specific situations. [See Section 3.4.3]

At the July EC quarterly meeting one of the new Assistant Administrators asked the Board to initiate a project to anticipate environmental problems of the futures. Following an endorsement from Administrator Browner, the EC established an Environmental Futures Project Steering Committee (EFC) to plan and guide what promises to be a major effort throughout FY94. The EC issued one letter report and one commentary, both addressing concerns with radon [See Section 3.4.4]:

- a) Radon Overview letter report
EPA-SAB-EC-LTR-93-010
- b) Radon Commentary
EPA-SAB-EC-COM-93-003

4.2.2 Clean Air Act Compliance Analysis Council (CAACAC)

The CAACAC is a statutory advisory group (mandated by the Clean Air Act Amendments of 1990) under the administrative umbrella of the SAB. Like CASAC, it reports directly to the Administrator and has a separate charter (Appendix A). The Council and the EEAC have complementary responsibilities and some overlap in membership, but the Council's primary mission is to conduct an on-going review of the Agency's retrospective and prospective analyses of the cost/benefit impacts of the Clean Air Act.

The CAACAC met three times during FY93, and released three letter reports:

- a) Review of the Agency's study to analyze impacts of the Clean Air Act (EPA-SAB-CAACAC-LTR-93-006).
[See section 3.3.3 d, Impacts on Agency Planning]
- b) Review of the Agency's retrospective study to analyze benefits of the Clean Air Act (EPA-SAB-CAACAC-LTR-93-007)
- c) Review of the Agency's prospective study to analyze benefits of the Clean Air Act (EPA-SAB-CAACAC-LTR-93-011)

4.2.3 Clean Air Scientific Advisory Committee (CASAC)

The Clean Air Scientific Advisory Committee is a statutory advisory group (estab-

lished under section 109 of the Clean Air Act as amended on August 7, 1977). CASAC has an independent charter (see Appendix A), but it operates under the administrative umbrella of the SAB and its Chair serves as a member of the Executive Committee. 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. CASAC does not set the review schedule; rather, it is responsive to Agency time tables.

CASAC met three times on a number of topics throughout FY93. In addition to a December planning meeting, the Committee met in June to review the draft air quality criteria document for oxides of nitrogen (NO_x), and a draft research strategy for alternative fuels developed by the Office of Research and Development. The Committee members have provided the Agency with written comments on both issues within the NO_x review, closure being reached in July, 1993. The Committee also met in August, 1993 to review the draft criteria document and staff paper for SO_x . CASAC members made numerous suggestions for the improvement of both documents. CASAC issued two letter reports and a commentary:

a) Alternative Fuels Research Strategy Review (EPA-SAB-CASAC-LTR-93-014)

b) NO_x Closure (EPA-SAB-CASAC-LTR-93-015)

c) Ozone Criteria Document development Schedule (EPA-SAB-CASAC-COM-93-004)

4.2.4 Drinking Water Committee (DWC)

The Drinking Water Committee was formed from a Subcommittee of the Environmental Health Committee and it includes experts in the effects and control of microbiological agents and chemicals in drinking water. In the past, the primary client for DWC was the Office of Drinking Water. This year they also served the Office of Science and Technology in a joint review with EPEC of the Great Lakes Water Quality Initiative and in further reviews of water quality criteria methods and the Office of Radiation Programs on drinking water treatment for radon.

The DWC held six committee meetings and issued four reports (one jointly with EPEC), one commentary, and a notice of consultation.

a) Review of the Methodology for Developing Ambient Water Quality Criteria for the Protection of Human Health (EPA-SAB-DWC-93-016)

b) Review by the Drinking Water Committee of the Water Research Program at the Health Effects Research Laboratory (HERL) (EPA-SAB-DWC-93-001).

c) Review of Issues Related to the Cost of Mitigating Indoor Radon Resulting from Drinking Water (EPA-SAB-DWC-93-015) [See section 3.4.2 Multi-media Risks of Radon].

- d) Review of the Great Lakes Water Quality Initiative (EPA-SAB-EPEC/DWC-93-005)
- e) Commentary on "Requirements for Nationwide Approval of New and Optionally Revised Methods for Inorganic and Organic Analyses in National Primary Drinking Water Regulations Monitoring" (EPA-SAB-DWC-COM-93-002)
- f) Notification of a Consultation on the Draft Drinking Water Criteria Documents for Chlorine and for Chloramines. (EPA-SAB-DWC-CON-93-001)

In addition, the public meetings held in FY93 will result in transmittals to the Administrator in FY94 on the following topics:

- a) Review of the Draft Criteria Document for Arsenic in Drinking Water
- b) Review of the Research Program on Disinfectants and Disinfection By-Products in the Risk Reduction Research Laboratory
- c) Commentary on the outcome of the regulatory negotiations regarding disinfectants and disinfection by-products.

4.2.5 Ecological Processes and Effects Committee (EPEC)

The Ecological Processes and Effects Committee (Formerly the Environmental Fate, Transport, and Effects Committee) was reorga-

nized in 1990 to address a growing number of ecological issues within the Agency. EPEC has identified five themes it will cover in its reviews: ecological risk assessment, EMAP, environmental quality criteria, global climate change, and habitat/biodiversity.

In FY93, EPEC held 7 meetings and produced two reports (one jointly with DWC), one letter report, and one commentary:

- a) Review of the Great Lakes Water Quality Initiative (EPA-SAB-EPEC/DWC-93-005). [See section 3.3.3 a.].
- b) Review of Sediment Criteria Development Methodology for Non-Ionic Organic Contaminants (EPA-SAB-EPEC-93-002)
- c) Review of the Research Program for Environmental Release of Biotechnology Products (EPA-SAB-EPEC-LTR-93-012)
- d) Commentary on the Agency's Research and Management Programs for Coastal Ecosystems (EPA-SAB-EPEC-COM-93-005) [See Section 3.3.3 d. Impacts on Agency Planning]

In keeping with its commitment to long-term involvement in the five issue (themes) areas listed above, the Committee scheduled regular briefings on key programs, and engaged in consultations on the following issues:

- a) The Agency's draft Habitat Strategy (EPA-SAB-EPEC-CON-93-003);
- b) Environmental Monitoring and Assessment Program (EMAP) Assessment

Hierarchy (EPA-SAB-EPEC-CON-93-005); and,

- c) Proposed Revisions to the Aquatic Life Water Quality Criteria Guidelines. (EPA-SAB-EPEC-CON-93-006)

The Committee expects to conduct formal reviews on these topics in the future, including a proposed methodology for developing sediment criteria for metals. Portions of the GLWQI, including wildlife criteria and bioaccumulation methodology, will likely be reexamined by the Committee as well.

Other reviews begun in FY93 include:

- a) an evaluation of draft technical guidance for biological criteria for streams
- b) a review of the ecological assessment in the RCRA Corrective Action Regulatory Impact Analysis (RIA)
- c) a review of the draft testing manual for discharge of dredged material into inland or near coastal waters
- d) a review of the EMAP Assessment Framework
- e) a review of portions of the global climate change research program.

4.2.6 Environmental Economics Advisory Committee (EEAC)

The Committee was created during FY91 at the request from the Administrator who

was responding to a recommendation in the Board's *Reducing Risk* report. The EEAC is constituted to assist and advise the Administrator and the Agency in analyzing the economic aspects of environmental decision-making, and in analyzing the long-term environmental aspects of various approaches to valuing and/or discounting ecological resources and systems.

During FY93, the Committee conducted four meetings and released one letter report: Science Advisory Board's Comments on the Office of Management and Budget's "Health-Health" Concept. (EPA-SAB-EEAC-LTR-93-005) [See Section 3.3.4]

The above report addresses a controversial theory that regulations imposed to promote specific health benefits could have unintended negative general health consequences. The Committee (in concert with three other SAB Committees) currently has two reports on the RCRA Regulatory Impact Analysis in preparation for early FY94 release. [See Section 3.4.1]

4.2.7 Environmental Engineering Committee (EEC)

The Environmental Engineering Committee is one of the most productive and diversified committees of the Board, by virtue of its agenda, its list of clients, and its collaboration with other organizations and SAB committees. The EEC continues to be a focal point for coordinating reviews of modeling and groundwater research, with a heavy emphasis on risk reduction techniques.

The EEC conducted eight meetings; three of the full Committee, and five of various

subcommittees, covering 10 topics, of which 4 were continuing from the previous fiscal year. In addition to the four reports and three commentaries described below, the Committee conducted a consultation on Groundwater Modeling Pathways for Radioactive Wastes.

The following reports were completed by the EEC and its various Ad Hoc Subcommittees during FY 1993:

- a) Review of the OSWER/CEPPO Draft Hydrogen Fluoride Study: Report to Congress. A report of the Hydrogen Fluoride Review Subcommittee of the Environmental Engineering Committee. (EPA-SAB-EEC-93-004)
- b) SAB/EEC Consultation on Groundwater Modeling Pathways for Radioactive Wastes. (EPA-SAB-EEC-CON-93-004)
- c) Review of the Office of Research and Development Underground Storage Tank Research Program. A report of the Underground Storage Tank Research Subcommittee of the Environmental Engineering Committee. (EPA-SAB-EEC-93-008)
- d) Review of the Office of Research and Development Indoor Air Engineering Research and Development Program. A report of the Indoor Air Engineering Research Subcommittee of the Environmental Engineering Committee. (EPA-SAB-EEC-93-009)
- e) Review of the OSWER Assessment Framework for Ground-Water Model Applications. A report of the Modeling Project Subcommittee of the Environmental Engineering Committee. (EPA-SAB-EEC-93-013)
- f) Review of Draft Agency Guidance for Conducting External Peer Review of Environmental Regulatory Modeling. A letter report of the Modeling peer Review Subcommittee of the Environmental Engineering Committee. (EPA-SAB-EEC-LTR-93-008) [See Section 3.3.3 d.]
- g) Review of OSWER/Office of Emergency and Remedial Response's draft Strategic Plan for Ground-Water Remediation at Superfund Sites (EPA-SAB-EEC-LTR-93-009)
- h) Review of the Global Climate Change Engineering Research and Development (R&D) Program. A letter report of the Global Climate Change Engineering Research Subcommittee of the Environmental Engineering Committee. (EPA-SAB-EEC-LTR-93-013)

The EEC continues to develop two additional reports in progress, namely the MMSOILS review which deals with the Office of Solid Waste's (OSW's) Resource Conservation and Recovery Act (RCRA) Regulatory Impact Analysis (RIA), as well as OSW's sponsored research being conducted at the Environmental Monitoring Systems Laboratory (EMSL) at Las

Vegas (LV), Nevada dealing with Quantitative Data Quality Objectives (QDQO) for Monitoring Well Network Design.

The Committee's report on the health benefit estimates incorporated in the RIA will be released early in FY94.

4.2.8 Environmental Health Committee (EHC)

The Environmental Health Committee (EHC) shares responsibilities for health effects reviews with several committees of the Board (DWC, IAQC, RAC, and CASAC). The principal focus for EHC has been issues related to development and use of guidelines for health risk assessments. This year, EHC has expanded its list of clients through a partnership with the Scientific Advisory Panel (SAP) of the Office of Pesticides and a review of Superfund risk assessment guidance.

The EHC met twice (both times in conjunction with the Office of Pesticides' Scientific Advisory Panel), and conducted one public teleconference as part of the Regulatory Impact Analysis (RIA) review. The Committee released three reports during the past year:

- a) Review of the draft Dermal Exposure Assessment Guidelines (EPA-SAB-EHC-93-006)
- b) Review of the Superfund Health Risk Assessment Guidance (EPA-SAB-EHC-93-007)
- c) Review of the Draft Policy on Risk Assessment with Data on Cholinesterase Inhibition (EPA-SAB-EHC-93-011)

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

The IAQC covers a broad range of health effects topics related to the integration of risks from individual sources. Most IAQC reviews support the Agency's health effects research and the indoor air programs.

The IAQC held one committee meeting during FY93. They issued one report and two letter reports:

- a) Review of the Office of Research and Development's Draft Report: "Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders" (EPA-SAB-IAQC-93-003). [See Section 3.3.4]
- b) Review of the Risk Assessment Forum's Draft Guidance Document on Showering with VOC Contaminated Tap Water (EPA-SAB-IAQC-LTR-93-002)
- c) Review of the Risk Assessment Forum's Draft Guidance on Assessing Health Risks of Gasoline Vapors in Buildings (EPA-SAB-IAQC-LTR-93-003)

The IAQC plans to take an active role in the environmental futures project during the coming year.

4.2.10 Radiation Advisory Committee (RAC)

The Radiation Advisory Committee is most closely aligned with the Office of Radiation Programs. In FY93 the RAC activities focused on advising the Administrator on the uncertainties and risks presented by radon in drinking water and on the preparation of a report, to be issued in FY94, on radon research needs [See Section 3.3.4 and 3.4.1]. The Committee continued its long-term efforts to persuade the Agency to undertake more frequent and more state-of-the-art uncertainty analyses.

During the year the RAC completed two full reports, one letter report, and two commentaries. One of these reports, High-Level Radioactive Waste, was largely the product of FY92 activity. In doing so, the RAC and its Radon Science Initiative Subcommittee conducted seven public meetings and another eleven two-hour conference call public meetings. The completed reports were:

- a) Review of High-Level Radioactive Waste/Carbon-14 Release (EPA-SAB-RAC-93-010)
- b) Review of Uncertainty Analysis of Risks Associated with Exposure to Radon (EPA-SAB-RAC-93-014)
- c) Evaluation of the Agency's Proposed Methodology for Estimating Radiogenic Cancer Risks (EPA-SAB-RAC-LTR-93-004)

- d) Radon Mitigation Research Preliminary Finding (EPA-SAB-RAC-COM-93-001)

- e) Quantitative Uncertainty Analysis for Radiological Assessments (EPA-SAB-RAC-COM-93-006)

The Committee has also completed work on a report that will be reviewed by the Executive Committee in FY93:

- a) Radon Research Needs.

The Committee continues to deal with review of the Agency's draft scoping study entitled "Diffuse NORM - Waste Characterization and Preliminary Risk Assessment." The Office of Radiation and Indoor Air (ORIA) draft document on NORM (Naturally-Occurring Radioactive Material) is not intended to be a technical background document to support regulations, but to be a scoping study to see if and where regulation might be needed in the future.

4.2.11 Research Strategies Advisory Committee (RSAC)

The Research Strategies Advisory Committee (RSAC) was formed based on the recommendation of the SAB's self-evaluation. RSAC has focused on research planning, ORD organization and management, budgets, and the development of Agency scientific personnel. The STAA review is an annual event for the SAB. This effort is an opportunity to review the more than 100 published technical articles by EPA scientists and engineers and to make

recommendations for professional recognition and cash awards from ORD.

During FY93, the RSAC held one Subcommittee meeting, and released one report and one letter report:

- a) Social Science Research Review
(EPA-SAB-RSAC-LTR-93-001)
- b) Recommendations on Nominations for
the 1993 Scientific and Technical
Achievement Awards (EPA-SAB-
RSAC-93-012)

4.3 Forging Partnerships in the SAB Staff Office

During FY93 the Staff is expanding its network for interacting with the public, with other federal agencies, and the scientific community at large. The Staff Office has connected to INTERNET and Agency electronic mail. Routine electronic communications with the members and the public are increasing. The Staff Office continues to provide a quarterly newsletter describing the activities of the committees and the staff. In FY93 the Staff Office distributed over two thousand copies of SAB reviews, commentaries, and special reports. Copies are also distributed through EPA's Public Information Center, Program Office hotlines and dockets, and through EPA's library system. The Staff Office plans to put future reports on a computer system so that our reports are more widely available to the general public.

In FY93 committee administration and tracking required by FACA were consolidated under the Committee Evaluation and Support

Staff. This organizational change has already resulted in savings for Federal Register publication expenses and improved fiscal management. During the transition, staff secretaries have provided invaluable efforts to track discrepancies and maintain their customer-oriented approach to the travel, pay, and personnel needs of the members and consultants.

We are continuing to prepare standard operating procedures, setting-up document control procedures, creating mailing systems, and highlighting training for all staff on administration and computer systems. We are refining our standard format for SAB reports and other advisory documents to reflect newly available computer equipment and software. We revised and reprinted the SAB informational brochure in FY93 for further distribution.

There is a great deal of interest on the part of both the public and the Agency concerning the issue of conflict of interest (COI). Particularly when contentious issues are discussed, the audience at a meeting is often curious as to the established point of view or previous pronouncements made by those sitting on an SAB Committee. In order to clarify procedures for public disclosure of potential conflicts of interest, the SAB Staff has prepared guidelines which documents the procedures that are followed by Committee Members and Consultants at SAB meetings. This procedure is voluntary and members and consultants are not obligated to reveal confidential information that is contained in their SF-450 (Appendix H).

4.4 SAB Staff in Transition

Dr. Edward Bender spent much of FY93 on a Department of Commerce fellowship with the Department of Energy. He returned to the SAB in July to help wrap up the Radon reviews and initiate the Environmental Futures Project.

Ms. LaShae Cardenas, a stay-in-school, completed her undergraduate curriculum, and left the SAB in the late winter for full time employment with the U.S. Marshalls Service.

Mr. Reynaldo Daniels came to the SAB in late winter replacing Ms. Cardenas. He provided important services to the immediate office of the Staff Director. He left at the end of the year for another stay-in-school appointment at EPA.

Ms. Frances Dolby, staff secretary to the Drinking Water Committee, left federal service.

Ms. Joanna Foellmer is broadening her horizons through her participation in the GLO (Greater Leadership Opportunities) program. This includes training and rotational assignments.

Mr. Manuel Gomez joined the Staff in November as the DFO for both the IAQTHEC and DWC. An Environmental Health Scientist by training, he previously worked for the National Institutes of Health on occupational health studies.

Ms. Janice Jones, staff secretary for CASAC and RSAC, was promoted to a Man-

agement Analyst and now works with the CES staff.

Ms. Stephanie Sanzone joined the staff in at the beginning of the year as DFO to EPEC. An oceanographer by training, Ms. Sanzone previously worked in the Agency's Coastal Management Program.

Ms. Darlene Sewell-Oliver, secretary to the Staff Director, tragically died in January, 1993, leaving a major gap in our offices and our lives.

Ms. Julie Silver, an intern from the University of Arizona, spent this summer comparing SAB procedures with other major scientific Federal Advisory Committees. Her report should help us to improve our process and our service to our clients.

Ms. Priscilla Tillery joined the Office as secretary to the Staff Director in January, 1993. She has quickly taken charge of the job, instituting improvements in office procedures that she honed in nearly two decades of exceptional service in the Office of Health Research prior to coming to the SAB.

Biographical sketches of the SAB senior staff are located in Appendix I.

FY93 was one of the most productive years in the history of the SAB. A record number of reports issued, and the backlog of reports was essentially eliminated. Our quality goal for FY93 is to transmit reports to the Administrator no later than six months following the final public meeting on the issue.

5. CONCLUSIONS AND PROJECTIONS

FY94 promises to be a time of continuing evolutionary change for the SAB. Recent years have seen more Board activity "at the interface" between risk assessment and risk management. The release of Future Risk in 1988, Reducing Risk in 1990, and an increasing number of commentaries has moved the SAB beyond its traditional role of "peer reviewer of last resort". These initiatives have been received with considerable enthusiasm by top Agency management. Administrator Reilly and Deputy Administrator Habicht have actively encouraged the SAB to, in the words of former CASAC Chair Roger McClellan, "answer the essay question"; i.e., How important is this issue and why? For example, partly as a result of these unsolicited efforts, the Agency is:

- a) Paying additional attention to microbial contamination of drinking water
- b) Examining the costs/benefits of regulating different chemicals in drinking water
- c) Investigating the effectiveness and accuracy of communication methods for radon
- d) Rethinking its conceptually different approaches to assessing chemical vs. radiation risks.

The coming year will cast into even sharper relief the growing gap between what the SAB is asked (and would like) to do and the legitimate resource constraints that exist. Consequently, a more conscious effort will be made to involve the Executive Committee, the Administrator, and the Agency in the establishing priorities for the SAB agenda. The recently formed Council of Science Advisors within the Agency will work as an Agency-wide "consultative group" to the SAB Staff Director.

It is the intention of the SAB in the coming year to explore further partnerships with other advisory groups. For example, initial contacts in FY93 have resulted in plans for coordinated reviews with advisory groups at the Agency for Toxic Substances and Disease Registry, the DHHS unit charged with advising EPA on health issues at such sites. The Environmental Futures Project will be a major collaboration for all the committees of the Board, requiring its members to expand its perspectives in both time and space. In the process, the Board will undoubtedly renew its partnership with the Agency and gain insight for meeting its new challenges.

The SAB Staff anticipates a busy year, augmented by new faces but constrained by the same limitations affecting the rest of the Agency. Our intention is to be in a position to welcome FY94 with as much satisfaction and enthusiasm as we welcomed FY93.

APPENDIX A

**Charters of the:
Science Advisory Board
Clean Air Scientific Advisory Committee
Clean Air Act Compliance Analysis Council**

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ADVISORY COMMITTEE CHARTER**

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. 11 SS 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 \$1,689,000 and the estimated Federal permanent staff support will be 14.6 work years.

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

October 4, 1991
Agency Approval Date

F. Henry Habicht II
Deputy Administrator

November 8, 1991
Date Filed with Congress

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ADVISORY COMMITTEE CHARTER**

**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. 11 SS 9(c).
2. **AUTHORITY** The Committee was specifically directed by law on August 7, 1977, 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; August 7, 1989; and August 7, 1991.
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,

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. Most members will serve as Special Government Employees. 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 work years of staff support.

6. DURATION. The Committee will be needed on a continuing basis. This charter will be effective until August 7, 1995, at which time the Committee charter may be renewed for another two-year period.

Carol M. Browner
Administrator

August 7, 1993
Date Filed with Congress

August 7, 1993
Agency Approval Date

**UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
ADVISORY COMMITTEE CHARTER**

Council on Clean Air Compliance Analysis

1. **PURPOSE.** This Charter establishes the Council on Clean Air Compliance Analysis in accordance with requirements of the Federal Advisory Committee Act, 5 U.S.C. App.11 SS 9(c).

2. **AUTHORITY.** The Council was specifically directed under section 812 of the Clean Air Act, as amended on November 15, 1990 (42 U.S.C. 7401 et seq.).

3. **OBJECTIVE AND SCOPE OF ACTIVITY.** The Council shall provide independent advice on technical and economic aspects of analyses and reports which the Agency prepares concerning the impacts of the Clean Air Act on the public health, economy, and the environment of the United States. The Council shall hold meetings, make necessary site visits and undertake other activities, necessary to meet its responsibilities. The Council 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. Use of consultants and establishment of subcommittees is authorized for any purpose consistent with this charter providing subcommittees report back to the full Council. The Council will report to the Administrator of the U.S. Environmental Protection Agency.

4. **FUNCTIONS.** As required by the Clean Air Act Amendments of 1990, the Council shall:

review the data to be used or any analysis required under section 812 and make recommendations on the use of such data,

review the methodology used to analyze such data and make recommendations on the use of such methodology, and prior to the issuance of a report to Congress required under section 812, review the findings of such report, and make recommendations concerning the validity and utility of such findings.

At the Agency's request, the Council will:

review other reports and studies prepared by the Agency relating to the benefits and costs of the Clean Air Act, and

provide advice on areas where additional knowledge is necessary to fully evaluate the impacts of the Clean Air Act and the research efforts necessary to provide such information.

5. COMPOSITION AND MEETINGS. The Council shall consist of at least 9 members, appointed by the Administrator for terms of two years, after consultation with the Secretary of Commerce and the Secretary of Labor. Most members will be appointed as Special Government Employees subject to the conflict-of-interest restrictions. The Administrator shall appoint a chairperson. Members of the Council shall be recognized experts in the fields of economics analysis, the health and environmental effects of air pollution, environmental sciences, or such other fields that the Administrator determines to be appropriate. The chairperson of the Council shall serve as a member of the Executive Committee of the Science Advisory Board. Other members of the Council may be members of the Science Advisory Board and may also serve on its various other committees or study groups. It is expected that the Council will meet two to four times per year. A full time employee of the Agency, who will serve as the Designated Federal Officer, will be present at all meetings and is authorized to adjourn any meeting whenever it is determined 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 \$150,000 and 1.5 work-years of staff support.

6. DURATION. The Council will be needed on a continuing basis, and may be renewed beyond its initial two-year period following the date of enactment of the Act establishing this Council, as authorized in accordance with section 14 of the Federal Advisory Committee Act.

F. Henry Habicht II
Deputy Administrator

March 31, 1992
Date Filed with Congress

March 13, 1992
Agency Approval Date

APPENDIX B

**SCIENCE ADVISORY BOARD
MEMBERS AND CONSULTANTS FOR FY92**

MEMBERS

LAST	FIRST	COMM.	INSTITUTION	CITY/STATE
Abriola	Linda	EEC	University of Michigan	ANN ARBOR, MI
Aim	Alvin L.	EC	Science Applications International Corp.	MCLEAN, VA
Auerbach	Stanley	RSAC	Oak Ridge National Labs	OAK RIDGE, TN
Bailey	Paul	IAQC	Mobil Oil	PRINCETON, NJ
Bean	Judy	DWC	University of Miami	MIAMI, FLA
Bockstael	Nancy	EEAC	University of Maryland	COLLEGE PARK, MD
Brown	Stephen	RAC	ENSR Consulting and Engineering	BERKLEY, CA
Bull	Richard	DWC	Washington State University	PULLMAN, WA
Bunn, Sr.	William	EHC	Mobil Corporation	PRINCETON, NJ
Cams	Keith E.	DWC	East Bay Municipal Utility District	PINOLE, CA
Carpenter	George F.	EEC	Michigan Dept. of Natural Resources	LANSING, MI
Cass	Glen	CASAC	California Institute of Technology	PASADENA, CA
Clesceri	Lenore	DWC	Rensselaer Polytechnic Institute	TROY, NY
Conway	Richard A.	EC/EEC	Union Carbide	S. CHARLESTON, WV
Cooper	Edwin	EPEC	University of California	LOS ANGELES, CA
Cooper	William E.	EPEC	Michigan State University	EAST LANSING, MI
Crump	Kenny	EHC	Clement Corporation	RUSTON, LA
Cummings	Ronald	CAACAC	University of New Mexico	ALBUQUERQUE, NM
Daisey	Joan M.	IAQC	Lawrence Berkley Laboratory	BERKLEY, CA
Dale	Virginia	EPEC	Oak Ridge National Lab	OAK RIDGE, TN
Deisler	Paul F.	RSAC/EC	Retired, Shell Oil	HOUSTON, TX
Dickson	Kenneth L.	EPEC/EC	University of North Texas	DENTON, TX
Dudek	Daniel	CAACAC	Environmental Defense Fund	NEW YORK, NY
Fabryka-Martin	Joan	RAC	Los Alamos National Labs	LOS ALAMOS, NM
Ford	Jean	CASAC	Harlem Hospital	NEW YORK, NY
Freeman	A. Myrick	EEAC/CAACAC	Bowdoin College	BRUNSWICK, ME

LAST	FIRST	COMM.	INSTITUTION	CITY/STATE
Gallo	Michael	EHC	Robert Wood Johnson Medical School	PISCATAWAY, NJ
Gonzalez	Ricardo	RAC	University of Puerto Rico	SAN JUAN, PR
Harwell	Mark A.	EPEC	University of Miami	MIAMI, FL
Hazen	Robert	IAQC	NJ Dept. of Env. Protection and Energy	TRENTON, NJ
Henderson	Rogene	EHC	Inhalation Toxicology Research Institute	ALBUQUERQUE, NM
Hoffman	Owen	RAC	Oak Ridge National Labs	OAK RIDGE, TN
Huggett	Robert J.	EPEC/EC	College of William and Mary	GLOUCESTER, VA
Johnson	Charles	DWC	Malcom-Pirnie (Retired)	BETHESDA, MD
Johnson	E.Marshall	EHC	Jefferson Medical College	PHILADELPHIA, PA
Johnson	James	EEC	Howard University	WASHINGTON, DC
Kachel	Wayne M.	EEC	Pilko and Associates	HOUSTON, TX
Kim	Nancy K.	EHC	New York Dept. of Health	ALBANY, NY
Kneese	Allan	EEAC/EC	Resources for the Future	WASHINGTON, DC
Kolstad	Charles	EEAC	University of California	BERKLEY, CA
Kripke	Margaret	EC	MD Anderson Hospital	HOUSTON, TX
Larson	Timothy V.	IAQC	University of Washington	SEATTLE, WA
Leaderer	Brian	IAQC	Pierce Lab, Yale Univ.	NEW HAVEN, CT
Lioy	Paul J.	IAQC	Robert Wood Johnson Medical School	PISCATAWAY, NJ
Lippmann	Morton	IAQC/RSAC/EC	New York University	TUXEDO, NY
Liu	Benjamin	CASAC	University of Minnesota	MINNEAPOLIS, MN
Loehr	Raymond C.	EC	University of Texas at Austin	AUSTIN, TX
Makhijani	Arjun	RAC	Energy and Environmental Research	TAKOMA PARK, MD
Maki	Alan	EPEC	Exxon	HOUSTON, TX
Matanoski	Genevieve	RAC/EC	Johns Hopkins University	BALTIMORE, MD
Mauderly	Joseph	CASAC	Inhalation Toxicology Research Institute	ALBUQUERQUE, NM
McClellan	Roger O.	RSAC/EC	Chemical Industry Institute of Toxicology	RTP, NC
McElroy	Anne	EPEC	SUNY-Stony Brook	STONY BROOK, NY
Mendelshon	Robert	EEAC/CAACAC	Yale School of Forestry	NEW HAVEN, CT

LAST	FIRST	COMM.	INSTITUTION	CITY/STATE
Monson	Richard	EHC	Harvard University	CAMBRIDGE, MA
Morandi	Maria	IAQC	University of Texas	HOUSTON, TX
Morse	Roger	IAQC	Environ. and Tech. Services, Inc.	TROY, NY
Murarka	Ishwar	EEC	Electric Power Research Institute	PALO ALTO, CA
Nordhaus	William	CAACAC/EEAC	Yale University	NEW HAVEN, CT
Norton	Bryan	EEAC	Georgia Tech.	ATLANTA, GA
Nygaard	Oddvar	RAC	Case Western Reserve University	CLEVELAND, OH
Oates	Wallace	EEAC/CAACAC	Michigan Dept of Natural Res.	COLLEGE PARK, MD
Pellizzari	Edo D.	DWC	Research Triangle Institute	RTP, NC
Pfaender	Frederic	EPEC	University of North Carolina	CHAPEL HILL, NC
Pitot	Henry C.	EHC	University of Wisconsin	MADISON, WI
Pohland	Frederick	EEC	University of Pittsburgh	PITTSBURGH, PA
Pojasek	Robert B.	EEC	GEI Consultants, Inc.	WINCHESTER, MA
Portney	Paul	EEAC/CAACAC	Resources for the Future	WASHINGTON, DC
Radike	Martha J.	EHC	University of Cincinnati	CINCINNATI, OH
Ray	Verne A.	DWC/EC	Pfizer, Inc.	GROTON, CT
Reitz	Richard	DWC	DOW Chemical	MIDLAND, MI
Repetto	Robert	EEAC	World Resources Institute	WASHINGTON, DC
Samet	Jonathan M	IAQC	New Mexico Tumor Registry	ALBUQUERQUE, NM
Schmalensee	Richard	EEAC/CAACAC/EC	Massachusetts Institute of Technology	CAMBRIDGE, MA
Seeker	W. Randall	RSAC/EEC	Energy and Env. research Corporation	IRVINE, CA
Sextro	Richard	RAC	Lawrence Berkley Laboratory	BERKLEY, CA
Shaub	Walter	EEC	Solid Waste Ass'n. of North America	SILVER SPRING, MD
Smith	V.Kerry	EEAC/EC	North Carolina State University	CHAPEL HILL, NC
Smith	William	EPEC	Yale University	HAVEN, CT
Snoeyink	Vernon L.	DWC	University of Illinois	URBANA, IL
Sobsey	Mark D.	DWC	University of North Carolina	CHAPEL HILL, NC
Stavins	Robert	EEAC	Harvard University	CAMBRIDGE, MA
Symons	James M.	DWC	University of Houston	HOUSTON, TX

LAST	FIRST	COMM.	INSTITUTION	CITY/STATE
Tierney	Susan	CASAC	Mass. Dept. of Env. Services	BOSTON, MA
Tietenberg	Thomas	EEAC/CAACAC	Colby College	WATERVILLE, ME
Upton	Arthur	EHC/EC	NYU-Retired	NEW YORK, NEW YORK
Utell	Mark	CASAC	University of Rochester	ROCHESTER, NY
Viscusi	Kip	EEAC/CAACAC	Duke University	DURHAM, NC
Volleque	Paul G.	RAC	MJP Risk Assessment Institute	IDAHO FALLS, ID
Ward	C. Herb	EEC	Rice University	HOUSTON, TX
Watson	James E.	RAC	University of North Carolina	CHAPEL HILL, NC
Wegman	David	EHC	University of Lowell	LOWELL, MA
White	Ronald	IAQC	American Lung Association	WASHINGTON, DC
Wolff	George T.	CASAC/RSAC/EC	General Motors Research Labs	WARREN, MI
Young	Terry F.	EPEC	Environmental Defense Fund	WASHINGTON, DC

CONSULTANTS

LAST NAME	FIRST NAME	AFFILIATION	CITY, STATE
Abrahamson	Seymour	University of Wisconsin	Madison, WI
Adams	Barry J.	University of Toronto	Toronto, Ontario CANADA
Adams	William	ABC Laboratories	Columbia, MD
Adelman	Ira R.	University of Minnesota	St. Paul, MN
Ahmed	Abdul Karim	Committee for NIE	Washington, DC
Alexander	Martin	Cornell University	Ithaca, NY
Amdur	Mary	New York University Medical Center	Tuxedo, NY
Anath	Chris	Battelle Memorial Institute	Washington, DC
Ancker-Johnson	Betsy	General Motors	Warren, MI
Andelman	Julian B.	University of Pittsburgh	Pittsburgh, PA
Anderson	Mary	University of Wisconsin	Madison, WI
Anderson	Mel	Chemical Industry Institute of Toxicology	Research Triangle Park, NC
Angle	Carol R.	University of Nebraska	Omaha, NE
Ayres	Stephen M.	Medical College of VA	Richmond, VA
Barcelona	Michael J.	Western Michigan University	Kalamazoo, MI
Bartell	Steven	Oak Ridge National Labs	Oak Ridge, TN

LAST NAME	FIRST NAME	AFFLIATION	CITY, STATE
Bates	David	Consultant	Vancouver, BC - CANADA
Beck	Barbara	Gradient Corp.	Cambridge, MA
Bedford	Barbara	Cornell Univer.	Ithaca, NY
Benedetti	Robert	Natl. Fire Protection Assn.	Quincy, MA.
Benforado	David	3M Environmental Engineering	St. Paul, MN
Benowitz	Neal	Univ. California/San Francisco	San Francisco, CA
Berkowitz	Joan B.	Farkas, Berkowitz & Co.	Washington, DC
Black	Jeffery	EA Technologies	Sparks, MD
Bond	James A.	Chemical Industry Inst. of Tox.	RTP, NC
Bostrom	Ann	Georgia Tech	Atlanta, GA
Bourdeau	Phillippe	European Commission	1049 Brussels, BELGIUM
Brambley	Michael R.	Battelle Pacific NW Labor	Richland, WA
Brennan	Eileen G.	Rutgers University	New Brunswick, NJ
Brierley	Carole	Newmont Metallurgical Services	Salt Lake City, UT
Brown	Ken	Private Consultant	Chapel Hill, NC
Bryan	George T.	Univ. Wisconsin/Gen. Clin	Madison, WI
Buffler	Patricia	Univ of Texas	Houston, TX
Burke	Thomas A.	Johns Hopkins Univ/Sch of Pub. Health	Baltimore, MD
Burns	David	University of CA/San Diego	San Diego, CA
Burton	C.Shepherd	Systems Applications Inc.	San Rafael, CA
Butler	Janis C.	J. C. Butler & Associates, Inc.	Salina, KS
Byus	Craig	University of California	Riverside, CA
Calvert	Jack G.	National Ctr for Atmospheric	Boulder, CO
Capen	Charles	Ohio State Univ	Columbus, OH
Cartwright	Keros	Illinois State Geological Survey	Champaign, Ill
Chambers	Janice E.	Mississippi State University	Columbus, MS
Chapman	Peter M.	EVA Consultants, Inc.	N. Vancouver, BC - CANADA
Chisolm	J. Julian	Kennedy Institute	Baltimore, MD
Clark	C. Scott	Univ. of Cincinnati Med Ctr	Cincinnati, OH
Clarkson	Thomas	Univ Of Rochester	Rochester, NY
Coburn	Ronald	University of Pennsylvania	Philadelphia, PA
Cohen	Yorum	UCLA	Los Angeles, CA
Colwell	Rita R.	Maryland Biotech Institute	College Park, MD

LAST NAME	FIRST NAME	AFFLIATION	CITY, STATE
Cortese	Anthony D.	Tufts University	Medford, MA
Costanza	Robert	Univ of Maryland/Chesapeake	Solomons Island, MD
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Crapo	James D.	Duke University Medical Center	Durham, NC
Crummett	Warren B.	Dow Chemical Company - US	Midland, MI
Curran-Smith	Anita S.	Robert Wood Johnson Medical Ctr	New Brunswick, NJ
Cutshall	Norman	Oak Ridge National Lab	Oak Ridge, TN
Cywin	Allen	Private Cons.	Savannah, GA
Dabberdt	Walter	National Ctr for Atmospheric Res	Boulder, CO
Dagirmanjian	Rose	University of Louisville	Louisville, KY
Davidson	James M.	University of Florida-IFA	Gainesville, FL
Dean	Robert G.	University of Florida	Gainesville, FL
Denison	Richard	Environmental Defense Fund	Washington, DC
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DiGiovanni	John	Univ of Texas	Smithville, TX
DiGiulio	Richard	Duke University	Durham, NC
Dockery	Douglas W.	Harvard University/Sch. of Public Health	Boston, MA
Drew	Robert T.	American Petroleum Institute	Washington, DC
Duan	Naihua	Rand Corporation	Santa Monica, CA
Duke	Thomas	Technical Resources, Inc.	Gulf Breeze, FL
Durkin	Patrick R.	Syracuse Env. Res.	Fayetteville, NC
Dysart, III	Benjamin C	Waste Mgmt. Env. Services, Inc.	Washington, DC
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Epstein	Lois	Environmental Defense Fund	Washington, DC
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Fayva	James A	Roy F Westin, Inc	West Chester, PA
Fechter	Laurence D.	Johns Hopkins Univ., School of Medicine	Baltimore, MD
Feero	William	Electric Research and Management	State College, PA
Fenters	James	ITT Research Institute	Chicago, IL

LAST NAME	FIRST NAME	AFFILIATION	CITY, STATE
Fisher	Gerald	Sandoz Research Institute	E. Hanover, NJ
Fishoff	Baruch	Carnegie Mellon Univ.	Pittsburgh, PA
Ford	Davis L.	Davis L. Ford & Associate	Austin, TX
Frank	Robert N.	Johns Hopkins Univ/Sch of Public Health	Baltimore, MD
Friedlander	Sheldon	University of California	Los Angeles, CA
Gad	Shayne C.	Testing Services	Research Tr
Gallagher	John	University of Delaware	Lewes, DE
Galloway	James N.	University of Virginia	Charlottesville, VA
Gasiewicz	Thomas A.	Univeristy of Rochester	Rochester, NY
Gentile	James M.	Hope College	Holland, MI
Gerba	Charles P.	University of Arizona	Tucson, AZ
Gibson	James E.	DOW ELANCO	Indianapolis, IN
Gillett	James	Cornell University, ICET	Ithaca, NY
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Goldstein	Bernard	Robert Wood Johnson School	Piscataway, NJ
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Green	George P	Public Service Company of Co.	Denver, CO
Greer	Linda	Natural Resources Defense Council	Washington, DC
Grelecki	Chester	Hazards Research Corporat	Mount Arlin, NJ
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Haimes	Yacov Y.	University of Virginia	Charlottesville, VA
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Hammond	Katharine	Univ Massachusetts	Worcester, MA
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Hartung	Rolf	Univ of Michigan/ Env & I	Ann Arbor, MI
Haun	William J.	Private Cons.	Maple Grove, MN
Heath	Clark	American Cancer Society	Atlanta, GA
Hedman	Paul	Brigham Young University	Provo, UT
Henry	Ronald C.	University of Southern Ca	Los Angeles, CA
Hershkowitz	Allen	Natural Resources Defense Council	New York, NY
Hidy	George	Electric Power Research Inst.	Palo Alto, CA
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McDowell	Judith M.	Woods Hole Oceanographic	Woods Hole, ME

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Mueller	Peter K.	Electric Power Research I	Palo Alto, CA
Mushak	Paul	University of North Carolina	Durham, NC
Nakles	David	RETEC, Inc.	Pittsburgh, PA
Napier	Bruce A.	Battelle Pacific Northwest	Richland, WA
Neal	Robert A	Vanderbilt University	Nashville, TN
Neilsen	David	Neilsen Ground Water Sci-Inc.	Gelena, OH
Nerode	Anil	Department of Mathematics	Ithaca, NY
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Neuhold	John M.	Utah State University	Logan, UT
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Nierenberg	William	Univ. of Calif	La Jolla, CA
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O'Connor	Donald	Manhattan College	Bronx, NY
O'Connor	Mary Ellen	University of Tulsa	Tulsa, OK
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O'Melia	Charles	Johns Hopkins University	Baltimore, MD

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Reuhl	Kenneth R.	Rutgers University	Piscataway, NJ
Rockette	Howard	Univ of Pittsburgh	Pittsburgh, PA
Rodericks	Joseph V.	Environ Corporation	Arlington, VA
Rodier	Patricia	University of Rochester	Rochester, NY
Rose	Joan B.	Research Associates in Microbiology	Tucson, AZ
Rowe	Robert D.	RCG/Hagler, Bailly, Inc.	Boulder, CO
Rozman	Karl K.	University of Kansas Medical Center	Kansas City, KS
Russell	Milton	University of Tennessee	Knoxville, TN
Russell	Llane B.	Oak Ridge National Laboratory	Oak Ridge, TN
Ryan	Barry	Harvard School of Public Health	Boston, MA
Rychman	Devere	REACT	St. Louis, MO
Safe	Stephen H.	Texas A&M University	College Station, TX
Sarofim	Adel F.	Massachusetts Institute of Technology	Cambridge, MA
Schechter	Harold	Ohio State University	Columbus, OH
Schiager	Keith	University of Utah	Salt Lake City, UT

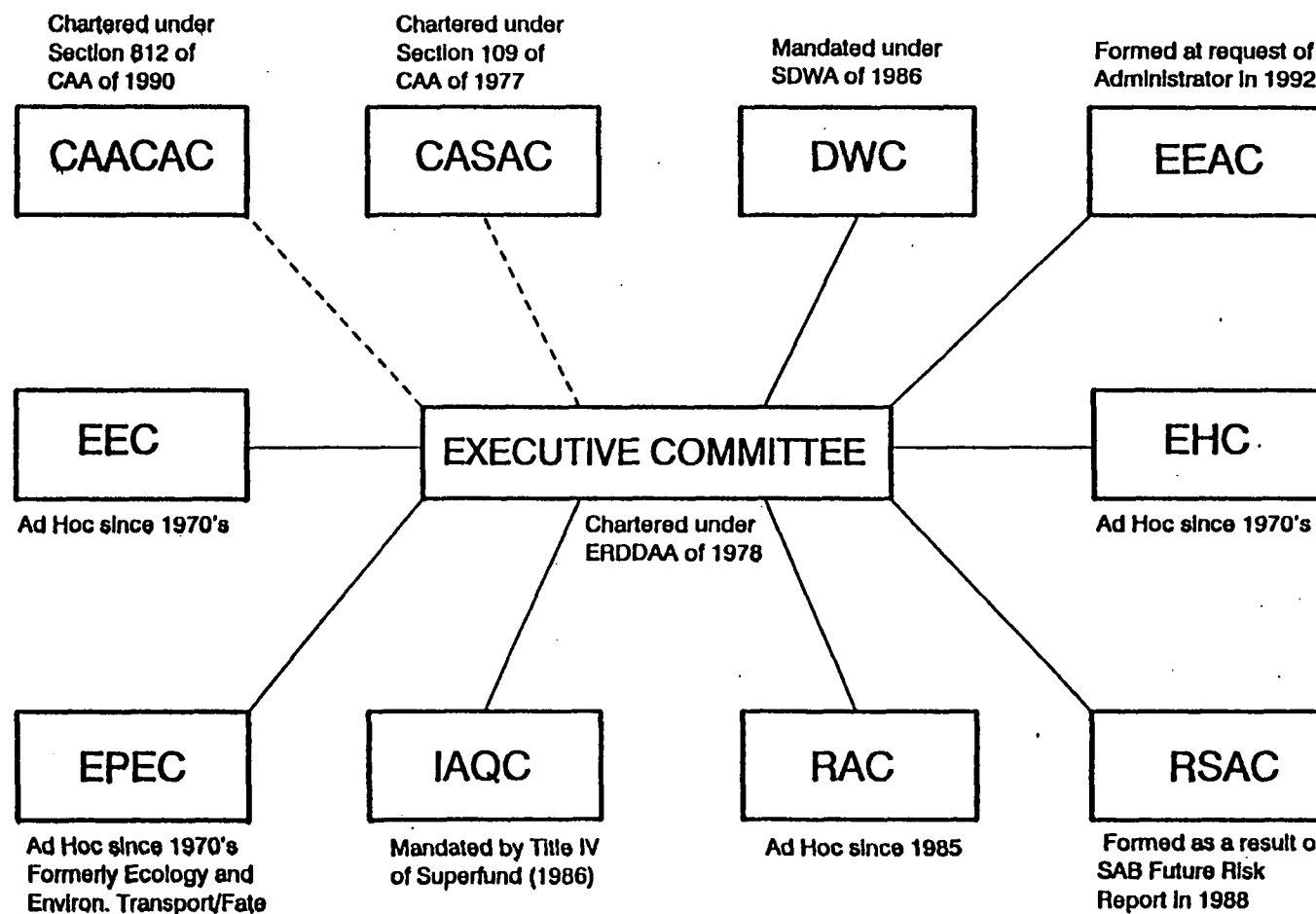
LAST NAME	FIRST NAME	AFFILIATION	CITY, STATE
Schnoor	Jerald	University of Iowa	Iowa City, IA
Schull	William	Univ of Texas	Houston, TX
Schutz	Donald F.	Teledyne Corporation	Westwood, NJ
Scialli	Anthony	Georgetown University Medical School	Washington, DC
Shugart	Herman H.	University of Virginia	Charlottesville, VA
Shugart	Lee	Oak Ridge National Labs	Oak Ridge, TN
Silbergeld	Ellen	University of Maryland	Baltimore, MD
Simon	Steven L.	University of North Carolina	Chapel Hill, NC
Sinclair	Warren	Private Cons.	Olney, MD
Skelly	John	Penn State University	University Park, PA
Slovic	Paul	Decision Research	Eugene, OR
Small	Mitchell	Carnegie Mellon Univ.	Pittsburgh, PA
Smith	Clifford V	GE Foundation	Fairfield, CT
Speizer	Frank E.	Channing Laboratory	Boston, MA
Starr	Thomas B.	Envrion Corporation	Arlington, VA
Stegeman	John	Woods Hole Oceanographic	Woods Hole, ME
Stein	Michael	University of Chicago	Chicago, IL
Stetter	Joseph R.	Transducer Research, Inc.	Naperville, IL
Stoltwijk	Jan	Yale University	New Haven, CT
Stout	Judy	Dauphin Island Sea Lab	Dauphin Island, AL
Strelow	Roger	Bechtel Environmental Institute	San Francisco, CA
Sunderman	Frederick	University of Connecticut	Farmington, CT
Susskind	Charles	University of California	Berkeley, CA
Swenberg	James A.	Private Cons.	Chapel Hill, NC
Tarr	Joel	Carnegie Mellon Universit	Pittsburgh, PA
Taub	Frieda B.	Univ of Washington	Seattle, WA
Taylor	George E.	Univer. of Nevada Reno/De	Reno, NV
Templeton	William L.	Battelle Pacific Northwest	Richland, WA
Tephly	Thomas R.	University of Iowa	Iowa City, Iowa
Thein	Myint	Oak Ridge NationalLab	Oak Ridge, TN
Thomas	Peter	IIT Research Inst	Chicago, IL
Thomas	Duncan C.	Univ of Southern California	Los Angeles, CA
Tikuisis	Peter	Defense Civil Inst of Env. Medicine	North York, Ontario CANADA

LAST NAME	FIRST NAME	AFFILIATION	CITY, STATE
Till	John E.	Radiological Assessments	Neeses, SC
Travis	Cheryl	University of Tennessee	Knoxville, TN
Trjonis	John C.	Santa Fe Research Corp.	Bloomington, IL
Trussell	R. Rhodes	James Mong Const. Eng., Inc.	Pasadena, CA
Turner	William A.	Private Cons.	Auburn, MA
Velzy	Charles O.	Charles R. Velzy Associat	Armonk, NY
Vlachos	Evan C.	Colorado State University	Fort Collins, CO
Von Lindern	Ian	Terragraphics Env Engineering	Moscow, ID
Wade	Dennis E.	Monsanto Company	St. Louis, MO
Waller	William T	Univ. of N Texas	Denton, TX
Wallsten	Thomas	University of North Carolina	Chapel Hill, NC
Walton	Barbara	Oak Ridge National Labs	Oak Ridge, TN
Ware	James H.	Harvard University	Boston, MA
Weiss	Bernard	Univ of Rochester Medical	Rochester, NY
Weiss	Scott	Harvard University	Boston, MA
Whicker	Floyd W.	Colorado State Universitiy	Fort Collins, CO
White	Warren H.	Washington University	St. Louis, MO
White	Irvin L.	Battelle Pacific NW Lab	Washington, DC
Wiersma	G. Bruce	University of Maine	Orono, MA
Williams	Robert H.	Center for Energy & Environment	Princeton, NJ
Wilson	John	NM Inst of Mining and Technology	Socorro, NM
Wilson	Barry	University of California-	Davis, CA
Wilson	Richard	Harvard University	Cambridge, MA
Wilson	Barry	Battelle Pacific NW Labs	Richland, WA
Winner	William	Oregon State University	Corvallis, OR
Witschi	Hanspeter	University of California-Davis	Davis, CA
Working	Peter	Genetech, Inc.	San Francisco, CA
Wyzga	Ronald	Electric Power Research Inst.	Palo Alto, CA
Zagraniski	Rebecca	New Jersey Department of	Trenton, NJ
Zimmerman	R. Eric	Escro Incorporated	Wilmette, IL

APPENDIX C

**SCIENCE ADVISORY BOARD
ORGANIZATIONAL CHART**

U.S. Environmental Protection Agency Science Advisory Board



All Committees (Except CAACAC and CASAC which report directly) report to the Administrator through the Executive Committee

APPENDIX D

GUIDELINES FOR SERVICE ON THE SCIENCE ADVISORY BOARD

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 95 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.

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:

- a) Members must be qualified by education, training and experience to evaluate scientific and technical information on matters referred to the Board.
- b) The composition of Board committees, subcommittees and panels must be "balanced", representing a range of legitimate technical opinion on the matter.
- c) No member of the Board may be a full-time government employee.
- d) 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.

Terms of Appointment

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,

<u>Years as member</u>	<u>Followed by years as Chair</u>	<u>Followed by years as member</u>	<u>Total years</u>
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 paperwork.

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

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 DFO's, 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.

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.

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 DFO's 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 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 forms 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.

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.

Prepared: Oct 14, 1991
Revised: Nov 26, 1991

APPENDIX E

STAFF SUPPORT AND COMMITTEE LEADERSHIP IN FY93

Many of the following positions were filled by two (or more) 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 FY93.

I - SUPPORT STAFF ALIGNMENT

STAFF DIRECTOR'S OFFICE

Staff Director:	Dr. Donald G. Barnes
Secretary to the Staff Director:	Ms. Darlene Sewell
	Mrs. Priscilla Tillery
Stay-in-School	Ms. LaShae Cardenas
	Mr. Raynaldo Daniels

ASSISTANT STAFF DIRECTOR

Assistant Staff Director:	Mr. Robert Flaak
---------------------------	------------------

Committee Evaluation and Support Staff

Acting Chief:	Mr. Randall Bond
Program Analyst:	Ms. Janice Jones
Project Coordinator:	Ms. Joanna Foellmer
Program Assistant:	Ms. Carolyn Osborne
Secretary:	Ms. Lori Gross
Stay-in-School:	Mr. Rasheed Tahir

Committee Operations Staff

Designated Federal Officers:	Dr. Jack Kooyoomjian
	Mr. Samuel Rondberg
	Dr. Edward Bender
	Mrs. Kathleen Conway
	Mr. Manuel Gomez
	Ms. Stephanie Sanzone
Staff Secretaries/ Meeting Planners:	Mrs. Dorothy Clark
	Mrs. Marcia Jolly
	Mrs. Diana Pozun
	Mrs. Mary Winston

II - COMMITTEE LEADERSHIP

Executive Committee

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

Clean Air Act Compliance Advisory Council

Chair:	Dr. Richard Schmalensee
Designated Federal Official:	Mr. Samuel Rondberg
	Dr. Jack Kooyoomjian
Staff Secretary:	Mrs. Mary Winston
	Mrs. Diana Pozun

Clean Air Scientific Advisory Committee

Chair:	Dr. George Wolff
Designated Federal Official:	Mr. Randall Bond
Staff Secretary:	Ms. Lori Gross

Drinking Water Committee

Chair:	Dr. Verne Ray
Designated Federal Official:	Mr. Robert Flaak
	Mr. Manuel Gomez
Staff Secretary:	Mrs. Frances Dolby
	Mrs. Dorothy Clark

Ecological Processes and Effects Committee

Chair:	Dr. Kenneth Dickson
Designated Federal Official:	Dr. Edward Bender Ms. Stephanie Sanzone
Staff Secretary:	Mrs. Marcia Jolly

Environmental Economics Advisory Committee

Co-Chair:	Dr. Allen Kneese
Co-Chair:	Dr. Kerry Smith
Designated Federal Official:	Mr. Samuel Rondberg
Staff Secretary:	Mrs. Mary Winston Mrs. Diana Pozun

Environmental Engineering Committee

Chair:	Mr. Richard Conway
Designated Federal Official:	Dr. Jack Kooyoomjian Mrs. Kathleen Conway
Staff Secretary:	Mrs. Diana Pozun Mrs. Dorothy Clark

Environmental Health Committee

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

Indoor Air Quality/Total Human Exposure Committee

Chair:	Dr. Morton Lippmann
Designated Federal Official:	Mr. Robert Flaak Mr. Manuel Gomez
Staff Secretary:	Ms. Carolyn Osborne Mrs. Frances Dolby Mrs. Mary Winston

Radiation Advisory Committee

Chair:	Dr. Geneviev Matanowski
Designated Federal Official:	Mrs. Kathleen Conway Dr. Jack Kooyoomjian
Staff Secretary:	Mrs. Dorothy Clark Ms. Diana Pozun

Research Strategies Advisory Committee

Chair:	Dr. Roger McClellan
Designated Federal Official:	Mr. Randall Bond Dr. Ed Bender
Staff Secretary:	Ms. Janice Jones Mrs. Marcia Jolly

ad hoc Industrial Excess Landfill Panel

Chair:	Dr. Robert Huggett
Designated Federal Official:	Mr. Robert Flaak
Staff Secretary:	Ms. Janice Jones Ms. Lori Gross

ad hoc Environmental Futures Committee

Chair:	Dr. Raymond Loehr
Designated Federal Officials:	Mr. Robert Flaak and Dr. Edward Bender
Staff Secretary:	Mrs. Joanna Foellmer

APPENDIX F - SAB MEETINGS FOR FY93

Key to Committees of the Science Advisory Board

CAACAC	Clean Air Act Compliance Advisory Council
CASAC	Clean Air Scientific Advisory Committee
DWC	Drinking Water Committee
EC	Executive Committee
EEAC	Environmental Economics Advisory Committee
EEC	Environmental Engineering Committee
EFAB	Environmental Financial Advisory Board (not an SAB Committee)
EHC	Environmental Health Committee
EPEC	Ecological Processes and Effects Committee
EFC	ad hoc Environmental Futures Committee
IAQC	Indoor Air Quality and Total Human Exposure Committee
IEL	ad hoc Industrial Excess Landfill Panel
RAC	Radiation Advisory Committee
RSAC	Research Strategies Advisory Committee
SAP	Scientific Advisory Panel (for FIFRA, not an SAB Panel)

Note: Meetings listed in *italics* and with an asterisk (*) are public conference calls

Dates	Issues/Projects	Committee
Oct 27-28	Quarterly Meeting	EC
Oct 28	SAB Annual Meeting Role of the SAB	EC/Annual
Oct 28-29	Planning/Coordination for FY93 UST Report IAQ Engineering Research Report Hydrogen Fluoride Report	EEC
Oct 29-30	Planning for FY93	DWC

Oct 29-30	Planning for FY93	EPEC
Oct 29-30	HLW/C-14 report	RAC
	Radon Sci Initiative	
	Commentary on Quant.	
	Uncertainty Analysis	
	Planning for FY93	
Nov 5-6	Cholinesterase Guidance	EHC/SAP
	RfD for Aldicarb/A.Sulfone	
*Nov 30	<i>Chaffee radon conf. call</i>	RAC
*Dec 2	<i>Chaffee radon conf. call</i>	RAC
*Dec 3	<i>Chaffee radon conf. call</i>	RAC
Dec 7-8	Disinfectant/Disinfectant	DWC
	Products Research Review	
	RREL, Cincinnati	
Dec 15-16	Consultations on Habitat cluster	EPEC
	Briefings:	
	Landscape component of EMAP	
	ORD Climate Change Research	
	Pesticide eco-risk decisions	
Dec 16	Briefings on Criteria Documents	CASAC
	for PM, Ozone, Carbon Monoxide,	
	and Sulfur Oxides	
*Dec 17	<i>Chaffee radon conf. call</i>	RAC
Dec 18	RCRA RIA CV Methodology - I	EEAC

Dec 22	Retrospective Study Cost data and uncertainty analysis Alternative methodologies for projecting emissions Emissions projections Air quality modeling methodology Valuation methodology Review process for scientific issues	CAACAC
Jan 14-15	OSWER Models	EEC
Jan 27	SAB/EFAB - I Exploration of rendering Science & Finance advice	EC/Sub
Jan 28-29	Quarterly meeting	EC
Feb 8-9	Chaffee: Radon cost options study	DWC/Sub
Feb 9-10	Review WQ Criteria for Human Health Consultations: Chemistry Testing Protocol Risk Characterization for Arsenic	DWC
<i>*Feb 10</i>	<i>Chaffee: Radon RA planning</i>	<i>RAC</i>
Feb 16-17	Radon Science Initiative	RAC/Sub
Feb 17-19	Chaffee: Radon RA Radon Science Initiative Source Term Initiative NORM/Residual	RAC
Feb 18-19	Biotech Research Review	EPEC/Sub

*Feb 25	Multi-Media Radon Risk Conf Call	RAC
Mar 2-4	Planning/Coordination Consultations: ORP: Aqueous Pathway Modeling OSWER: Leaking mountain Follow up: DWC's Chaffee radon cost options HF Report to Congress: Update Review: Draft guidance for peer review of model development and application (Agencywide Task Force) Superfund GW Strategic Plan	EEC
Mar 3-4	Scientific and Technological Achievement Awards (STAA - Closed meeting)	RSAC/Subc
*Mar 24	Radon Science Initiative	RAC
Mar 25	Air quality monitoring results Estimation of physical effects Valuation of physical effects Uncertainty analyses	CAACAC
Apr 1-2	2,4-D Review	EHC/SAP
Apr 19-20	Review: Arsenic Briefings: Fluoride Chemical Testing Protocol	DWC
Apr 22-23	Quarterly meeting	EC
Apr 22-23	RCRA RIA - MM Soils Model Review	EEC

Apr 23	SAB/EFAB -- II Exploration of rendering Science & Finance advice	EC/Sub
Apr 27-28	NORM/Residuals Retro/Risk Reduction EMF Status Briefing	RAC
Apr 30	CV Methodology -- II	EEAC
May 13-14	Review: Biocriteria - Streams	EPEC/Sub
May 20-21	Radon Science Initiative	RAC
May 26-27	Global Climate Change Engr Res.	EEC
Jun 8	Review Prospective Study	CAACAC
*Jun 14	<i>ORIA Radiation Issues</i>	RAC
*Jun 21	<i>ORIA Radiation Issues</i>	RAC
Jun 21-23	EPEC Planning Meeting Reviews: EMAP Integration and Assessment RCRA RIA Ecological Impact Assessment Consultations: Ecorisk WQC	EPEC
Jun 29 - Jul 1	Alternative Fuels Research Nitrogen Oxides NAAQS (RTP, NC)	CASAC
Jun 29	Consultation: MMSoils Data	EEC/Subc

Jun 29 - Jul 1	Planning/Coordination Hazardous Waste ID Rule Review: Oily Waste Briefing: HF Report to Congress: Findings and Recommendations	EEC
Jul 7-9	Dredged materials guide (Goldbook)	EPEC/Sub
Jul 13	RCRA RIA	EEAC
Jul 19	Radon Chafee-Lautenberg Steering Committee	EC/Sub
Jul 19-21	NORM Radon Science Initiative	RAC
Jul 20-21	Industrial Excess Landfill (IEL) - I (Uniontown, OH)	EC/IEL
Jul 20-21	Quarterly meeting	EC
Jul 29-30	RCRA GW Monitoring: QDQOs (in EMSL-LV)	EEC
Aug 16-17	Consultations: Phase IV b Microbial Risk Assessment Briefing/Review: Fluoride RegNeg FY94 Planning	DWC
Aug 19	Sulfur Oxides NAAQS	CASAC
Aug 30	Futures Steering Committee	EC/Subc/Futures
Aug 30	RCRA RIA Steering Committee	EC/Subc/RCRA
Sep 7-8	Radon Science Initiative	RAC
Sep 8-9	IAQ Research (RTP, NC)	IAQC

<i>*Sep 10</i>	<i>NORM/Residuals - Conf. Call Overview/Retrospective</i>	<i>RAC</i>
<i>*Sep 17</i>	<i>NORM/Residuals - Conf. Call Overview/Retrospective</i>	<i>RAC</i>
Sep 14-15	Global Climate	EPEC
Sep 21-22	Industrial Excess Landfill (IEL) - II	EC/Subc/IEL
Sep 23	Contingent Valuation Methodology RIA Approach	EEAC
<i>*Sep 24</i>	<i>RCRA-RIA - Conf. Call</i>	<i>EHC</i>
Sep 30	Futures Steering Group	EC/Subc/Futures

Total: 54 Open Meetings
1 Closed Meeting
12 Open Conference Call Meetings

APPENDIX G**SCIENCE ADVISORY BOARD FY93 REPORT ABSTRACTS****G-1. LIST OF SAB REPORTS, LETTERS, COMMENTARIES, AND
CONSULTATIONS FOR FY93****FY 1993 REPORTS**

EPA-SAB-DWC-93-001 Review by the Drinking Water Committee of the Water Research Program at the Health Effects Research Laboratory (HERL).

EPA-SAB-EPEC-93-002 Review of Sediment Criteria Development Methodology for Non-Ionic Organic Contaminants.

EPA-SAB-IAQC-93-003 Review of the Office of Research and Development's Draft Report: "Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders"

EPA-SAB-EEC-93-004 Review of the OSWER/CEPPO Draft Hydrogen Fluoride Study: Report to Congress.

EPA-SAB-EPEC/DWC-93-005 Evaluation of the Guidance for the Great Lakes Water Quality Initiative prepared jointly by the Great Lakes Water Quality Subcommittee of the Ecological Processes and Effects Committee and the Drinking Water Committee.

EPA-SAB-EHC-93-006 Review of the Office of Research and Development's draft report Dermal Exposure Assessment: Principles and Applications.

EPA-SAB-EHC-93-007 Review of Superfund Site Health Risk Assessment Guidelines

EPA-SAB-EEC-93-008 Review of the Underground Storage Tank Research Program

EPA-SAB-EEC-93-009 Review of the Indoor Air Engineering Research Program

EPA-SAB-RAC-93-010 Review of Gaseous Release of Carbon-14

EPA-SAB-EHC-93-011 Review of Cholinesterase Inhibition and Risk Assessment

EPA-SAB-RSAC-93-012 Recommendations on the 1992 Scientific and Technological Achievement Award Nominations

EPA-SAB-EEC-93-013 Review of the Assessment Framework for Ground-Water Model Applications

EPA-SAB-RAC-93-014 Review of Uncertainty Analysis of Risks Associated with Exposure to Radon—"Chafee-Lautenberg Multi-media Risk Study"

EPA-SAB-DWC-93-015 Review of Issues Related to the Cost of Mitigating Indoor Radon Resulting from Drinking Water

EPA-SAB-DWC-93-016 SAB Review of the ongoing revision of the methodology for deriving National Ambient Water Quality Criteria for the protection of human health

FY 1993 LETTER REPORTS

EPA-SAB-RSAC-LTR-93-001 Research Strategies Advisory Committee Review of the EPA draft "Stimulating Environmental Progress: A Social Science Research Agenda".

EPA-SAB-IAQC-LTR-93-002 SAB Review of the Risk Assessment Forum's Draft Guidance Document on Showering with VOC Contaminated Tap Water.

EPA-SAB-IAQC-LTR-93-003 SAB Review of the Risk Assessment Forum's Draft Guidance on Assessing Health Risks of Gasoline Vapors in Buildings.

EPA-SAB-RAC-LTR-93-004 Evaluation of EPA's Proposed Methodology for Estimating Radiogenic Cancer Risks.

EPA-SAB-EEAC-LTR-93-005 SAB's Comments on the Office of Management and Budget's "Health-Health" Concept.

EPA-SAB-CAACAC-LTR-93-006 SAB's review of the Office of Policy, Planning, and Evaluation's (OPPE) and the Office of Air and Radiation's (OAR) progress on the retrospective study of the impacts of the Clean Air Act.

EPA-SAB-CAACAC-LTR-93-007 SAB's review of the Office of Policy, Planning, and Evaluation's (OPPE) and the Office of Air and Radiation's (OAR) progress on the retrospective and prospective studies of the impacts of the Clean Air Act.

EPA-SAB-EEC-LTR-93-008 Review of Draft Agency Guidance for conducting External Peer Review of Environmental Regulatory Modeling.

EPA-SAB-EEC-LTR-93-009 SAB Review of OSWER/Office of Emergency and Remedial Response's draft Strategic Plan for Ground-Water Remediation at Superfund Sites.

EPA-SAB-EC-LTR-93-010 SAB Review of Multimedia Risk and Cost Assessment of Radon in Drinking Water.

EPA-SAB-CAACAC-LTR-93-011 SAB's review of the Office of Policy, Planning, and Evaluation's (OPPE) and the Office of Air and Radiation's (OAR) progress on the prospective study of the impacts of the Clean Air Act.

EPA-SAB-EPEC-LTR-93-012 Review of the Research Program for Environmental Release of Biotechnology Products.

EPA-SAB-EEC-LTR-93-013 Review of the Global Climate Change Engineering Research and Development (R&D) Program.

EPA-SAB-CASAC-LTR-93-014 Alternative Fuels Research Strategy Review

EPA-SAB-CASAC-LTR-93-015 NO_x Closure

FY 1993 COMMENTARIES

EPA-SAB-RAC-COM-93-001 Radon Mitigation Research Preliminary Finding

EPA-SAB-DWC-COM-93-002 SAB's Commentary on "Requirements for Nationwide Approval of New and Optionally Revised Methods for Inorganic and Organic Analyses in National Primary Drinking Water Regulations Monitoring"

EPA-SAB-EC-COM-93-003 Interim response on the SAB review of Agency's Chafee-Lautenberg study of the risks from radon exposure and the costs of mitigating such risks

EPA-SAB-CASAC-COM-93-004 Ozone Criteria Document Development Schedule

EPA-SAB-EPEC-COM-93-005 SAB's concern over the Agency's decreasing research and management activity in the coastal environment

EPA-SAB-RAC-COM-93-006 Quantitative Uncertainty Analysis for Radiological Assessments.

FY 1993 CONSULTATIONS

EPA-SAB-DWC-CON-93-001 Notification of a Consultation on the Draft Drinking Water Criteria Documents for Chlorine and for Chloramines in water.

EPA-SAB-RAC-CON-93-002 Notification of a Consultation on a Congressionally Mandated Study of Radon in Water.

EPA-SAB-EPEC-CON-93-003 Notification of a Consultation with the Habitat Cluster on EPA's Habitat Strategy.

EPA-SAB-EEC-CON-93-004 SAB's Consultation on Groundwater Modeling Pathways for Radioactive Wastes.

EPA-SAB-EPEC-CON-93-005 Notification of a Consultation on the Environmental Monitoring and Assessment Program's Assessment Hierarchy.

EPA-SAB-EPEC-CON-93-006 Notification of a Consultation on Revisions to the Aquatic Life Water Quality Criteria Guidelines.

G-2. Abstracts of SAB Reports and Commentaries for FY93**REPORTS**

EPA-SAB-DWC-93-001 Review of the Water Research Program at the Health Effects Research Laboratory (HERL)

On December 17-19, 1991, the Drinking Water Committee (DWC) of the Science Advisory Board (SAB) met in Research Triangle Park, NC to review the scope and direction of the Agency's drinking water health research program of the HERL of the Office of Research and Development (ORD). DWC received overview briefings and resource related presentations from laboratory managers, and presentations on specific research initiatives from researchers.

In general, DWC found that research was being conducted on appropriate issues and in a sound manner. The laboratory is to be commended for providing cooperation among scientists from different divisions. Nevertheless, the Committee expressed concern over the fragmentation of the program, the dwindling research funds, and the need for focused leadership.

The Committee recommends that HERL effectively use its existing resources and leverage others to address key research needs in drinking water, microbiology, and health. The Committee suggests that this can be done by putting greater emphasis on drinking water microbiology and health effects research activities within existing HERL divisions, by creating stronger and more effective linkages with other EPA labs that have resources and expertise in this area, and by creating and utilizing extramural funds as needed.

EPA-SAB-EPEC-93-002 SAB Review of Sediment Criteria Development Methodology for Non-ionic Organic Contaminants

The report represents the conclusions and recommendations of the U.S. Environmental Protection Agency's Science Advisory Board regarding EPA's Sediment Criteria Development Methodology. The Review was held June 10-11, 1992 in Arlington, VA by the Sediment Quality Subcommittee of the Ecological Processes and Effects Committee. The report commends EPA for its progress toward reducing the uncertainties associated with estimates of safe levels of non-ionic organic contaminants in sediments using the Equilibrium Partitioning (EqP) approach. The report supports the EqP concept to develop sediment criteria where the conditions of equilibrium among the various phases of sediments are likely. The Agency is cautioned that there are still uncertainties associated with application of the criteria due to limited field validation data currently available. It is recommended that EPA use defined ranges of sediment contaminant concentrations based on the EqP approach that indicate whether or not sediments are acceptable, unacceptable, or require further evaluation. The Subcommittee also recommends further testing to improve the method and reduce uncertainty. It is also recommended that the criteria boundaries be revised periodically to

reflect recent knowledge and experience, and that a document be developed to explain the derivation, application, and monitoring procedures for the Sediment Quality Criteria.

EPA-SAB-IAQC-93-003 Review of the Office of Research and Development's Draft Report: Respiratory Health Effects of Smoking: Lung Cancer and Other Disorders

The Science Advisory Board's (SAB) Indoor Air and Total Human Exposure Committee (IAQTHEC) met on July 21-22, 1992 to review the draft EPA document Respiratory Health Effects of Passive Smoking: Lung Cancer and Other Disorders (EPA/600/6-90/006B, May 1992 SAB Review Draft). The Committee provided responses to fifteen specific questions and provided commentary on chapters of the draft document. The Committee noted the great improvement in the discussion and analysis of effects of environmental tobacco smoke (ETS) on the health of children. The coverage of the pertinent literature is much more complete in this draft than in the previous draft, and the specification and quantitation of the identifiable health risks is presented in a clear and defensible manner. This new material provides a basis for the Agency to issue an overall risk assessment on ETS that gives an appropriate emphasis to non-cancer health effects. The Committee also noted that the revised draft has an improved presentation, discussion, and analysis of ETS as a lung carcinogen, providing a firmer basis for the designation of ETS as an EPA Class A Carcinogen. The Committee was unanimous in endorsing this classification.

EPA-SAB-EEC-93-004 Review of the Office of Solid Waste and Emergency Response (OSWER), Chemical Emergency Preparedness and Prevention Office (CEPPO) draft Report to Congress entitled "Hydrogen Fluoride Study: Report to Congress" (May 1992 draft)

The Hydrogen Fluoride Review Subcommittee (HFRS) of the Environmental Engineering Committee (EEC) of the EPA Science Advisory Board has reviewed the draft Report to Congress entitled "Hydrogen Fluoride Study: Report to Congress," and offered a number of recommendations.

The HFRS agrees that Hydrogen Fluoride (HF) production and use is important to a wide range of stakeholders. Increased regulation of HF could potentially have far-reaching impacts if extended with regard to other chemicals. The Subcommittee suggested that a study using life cycle analysis concepts of health, environment and safety could be undertaken concerning both the use of HF and alternatives to the use of HF, noting that Congress should be advised whether alternatives to HF have substantial risk. The Report to Congress should indicate the implications of the findings of this study on the evaluation of hazards associated with other industrial chemicals.

The HFRS recommended that the Agency employ a more rigorous definition of the concepts of hazards, consequences and worst-case scenarios, and that a credible worst-case

accidental release scenario be developed. The HFRS made substantial recommendations on the use of dispersion models as they apply to various accident scenarios, and a number of other specific recommendations intended to improve the draft report to Congress.

EPA-SAB-EPEC/DWC-93-005

SAB Review of Guidance for the Great Lakes Water Quality Initiative

The report represents the conclusions and recommendations of the U.S. Environmental Protection Agency's Science Advisory Board regarding a EPA guidance for the Great Lakes Water Quality Initiative (GLWQI). The SAB commends the Agency for the interactions among the states, EPA, the private sector and the scientific community which have lead to the development of this initiative. The SAB recommended that the introduction to the guidance be revised to explain the unique characteristics of the Great Lakes and the rationale for an initiative. The SAB endorsed the ecosystems approach of the initiative and recommended that it also address non-point sources, atmospheric deposition and contaminated sediments. The Subcommittee agreed with the concept of Tier 1 and Tier 2 criteria but was concerned that the minimal data base currently required in Tier 2 water quality criterion - a single acute toxicity test - is inadequate. They were also concerned that the risk management apparatus currently in place; cf., the anti-backsliding provisions of the Clean Water Act, may prevent adjustments in Tier 2 numbers when more data become available. The Subcommittee recommends that the approach to protect wildlife be expanded to consider ecologically representative species and species sensitivities and to focus on populations. The current wildlife criteria concepts were formulated around the perceived requirements of the human health risk assessment paradigm and they are inadequate for wildlife. The Subcommittee recommends that the program also consider both the biologically active form and the total contaminants concentrations when establishing water quality criteria. The GLWQI should provide some specific guidance on how to handle monitoring compliance for criteria which are below the detection limits of analytical methods. The Subcommittee recommends that the GLWQI add procedures to predict the persistence of chemicals.

The SAB is concerned that the human health risk assessment methodology being advanced by the GLWQI is not using updated approaches for exposure assessment and carcinogen classification that are being used by EPA and others. Tier 1 should be limited to chemicals with good data on carcinogenesis, reproductive and developmental/teratogenic effects. The linear multistage model is a reasonable default methodology for chemicals which lack more detailed information on their modes of action. Ideally, multiple carcinogens should be considered on a case by case basis. The SAB encouraged EPA to use a variety of broad criteria to classify chemicals as Tier 2 to encourage improvements in the data base. The SAB recommended that the draft human health criteria, documents and guidance for their development be revised to reflect SAB comments and improve the analysis and presentation of data and rationale for the development of the criteria.

EPA-SAB-EHC-93-006

Review of the Office of Research and Development's draft report
Dermal Exposure Assessment: Principles and Applications

The Environmental Health Committee (EHC) met in Washington, DC on August 17-18, 1992 to review the EPA draft report *Dermal Exposure Assessment: Principles and Applications* (EPA/600/8-91/011B, January 1992). The Committee addressed the scientific support for document's general guidance on dermal exposure assessment and considered specific issues relating to skin composition and dermal absorption processes; skin models for evaluation of dermal absorbed dose; and the applicability of measured absorption constants for chemicals in air, water, and soil.

The Committee commended the Agency on the document's quality and general rigor, but also noted areas in which improvements were possible. The EHC recommended that the document state more clearly when experimental data, rather than values estimated from models, should be used for assessment, and stated its preference for *in vivo* data, and for experimentally-derived data when available.

The Committee would like to see further examination of model performance before the models are widely applied. Although the models appear to fit many compounds well, there is an important subset of compounds where the fit is poor, however. The document needs to clearly state the limitations of the models. Additional data should be sought to both expand and strengthen the models. The Committee also feels that it is important to have the model validation and estimation efforts undergo a rigorous statistical analysis. Full validation of the model will require also the input of toxicologists with expertise in skin absorption and metabolism and analytical chemists, in order to deal with the important issues of metabolic activation/detoxification by the skin itself.

Finally, although a model to estimate the dermally absorbed dose per-event is useful, it would be best if the model could use measured, rather than predicted, dermal permeability values when possible. When measured absorption data of good quality are available, they should have precedence over model estimates.

EPA-SAB-EHC-93-007

Review of Superfund Site Health Risk Assessment Guidelines

The Office of Solid Waste and Emergency Response (OSWER) developed the Risk Assessment Guidance for Superfund (RAGS), Human Health Evaluation Manual (HHEM), Part A--Baseline Risk Assessment (December 1989), supplemented in March 1991 with *Standard Default Exposure Factors* guidance, and *Part B--Development of Risk-based Preliminary Remediation Goals*, and *Part C--Risk Evaluation of Remedial Alternatives* in December 1991 (as interim documents) to guide Agency staff performing site-specific assessments of human and environmental risk to determine the need for remedial action. At the request of OSWER, the Science Advisory Board's Environmental Health Committee (EHC) met on April 7-8, 1992 to review four broad issue areas relating to Superfund human health risk assessment: a) Defining and calculating the Reasonable Maximum Exposure (RME); b) Assessing and

dealing with exposures to multiple chemicals and using the Hazard index (HI)/Hazard Quotient (HQ) to assess risk; c) reference doses in remediation goal-setting; and d) Use of appropriate defaults for characterizing less-than-lifetime exposure to toxicants. The Committee found OSWER's attempts to improve the consistency of its risk assessment methodology to be praiseworthy and a good start, but noted areas where a revised approach is recommended.

The Committee is of the opinion that there are some serious conceptual and practical problems with the proposal to calculate an RME based on an upper confidence limit (UCL) on the average concentration at a site. The EHC recommends that the EPA move to a distributional approach to calculating the RME, i.e., developing distributions for each of the terms or variables needed to calculate individual exposures and their distributions. Given the difficulty in interpreting the RME as presently calculated, the Committee recommends that some type of 'most reasonable' estimate of exposure also be calculated and made available to risk managers along with the RME. The Committee agrees with OSWER that, as long as some type of mean concentration is to be employed to estimate human exposure, an arithmetic mean is more appropriate than a geometric mean.

The Committee is concerned about the approach of using RfD-derived Hazard Quotients/Hazard Indices as a basis for adding "risks" from exposure to complex mixtures. Quantitative applications using dose-response data (not the "point" data represented by LOAEL/NOAEL-derived RfDs) would be preferable, as would the use of alternatives to the current default approaches that assume risk additivity. The use of the HI itself can be misleading, and it should be used as a "fallback," with full recognition of its possible inapplicability, only when more refined toxicological data are not available. Interpretation of an HI greater than 1 can vary depending on several toxicological factors. Although it is likely that risk increases as the HI exceeds 1, we can not state (without a more complete understanding of interaction mechanisms) how rapidly this increase occurs, nor can we rely on HI-based comparisons of risks when the HIs are greater than 1.

Three approaches for using RfDs to develop risk-based remediation goals for contaminated soil were presented. The most supportable of these uses a 30-year time-weighted average with a chronic RfD; differences between the three approaches are not dramatic however, and OSWER should study all three approaches to verify its ultimate choice (or range of choices).

The Committee sees no particular problems in the existing approach for dealing with short-term toxicity estimates. OSWER should take cognizance of the EPA-sponsored work at the National Academy of Science on Community Emergency Exposure Levels, and of the work on Emergency Response Planning Guidelines by the American Conference of Governmental Industrial Hygienists.

EPA-SAB-EEC-93-008**Review of the Underground Storage Tank Research Program**

The Underground Storage Tank Research Subcommittee (USTRS) of the Environmental Engineering Subcommittee (EEC) of the Environmental Protection Agency's (EPA) Science Advisory Board (SAB) has prepared a report on the Agency's underground storage tank (UST) research program. The USTRS met on June 29 and 30, 1992 and reviewed the Agency's UST research-in-progress, as well as plans for future UST-related research.

The USTRS found that the Risk Reduction Engineering Research Laboratory (RREL) at Edison, NJ and the Environmental Monitoring and Support Laboratory (EMSL) at Las Vegas, NV prepared and presented thorough and well-conceived documents. The USTRS commented on broad research topics, as well as specific projects, pointing out other areas of promise, such as bioremediation and ground-penetrating radar, and cited the need for more research on the basic concepts of contaminant dynamics and other factors affecting fate and transport in the subsurface environment, the properties of petroleum products, and the behavior of non-aqueous phase liquids (NAPLs). The USTRS commended the development and use of the LOCI conceptual model as a teaching or demonstration tool, and recommended its wider application, especially in state and local government and other agency programs.

The USTRS cited, among a number of other recommendations, the need for coordination and more systematic technology transfer activities between the laboratories, development of more non-invasive real-time site assessment techniques, emphasis on corrosion retrofit research and leak prevention, and identification and evaluation of currently practiced as well as new and improved cleanup technologies. These recommendations were made toward the entire UST research effort, in an effort to improve an already well-designed program in an important research area.

EPA-SAB-EEC-93-009**Review of the Indoor Air Engineering Research Program**

The Indoor Air Engineering Research Subcommittee (IAERS) of the Environmental Engineering Committee (EEC) of the EPA Science Advisory Board (SAB) has prepared a report on the Agency's Office of Research and Development (ORD), Air and Energy Engineering Research Laboratory's (AEERL) indoor air engineering research and development (R&D) program. The IAERS met on July 20 and 21, 1992.

The review focused on four specific program areas: two of the areas (emission measurements and source-exposure modeling) are well established; the other two areas (microbial contaminant control and new strategic directions) are emerging research areas. The IAERS found the AEERL approach to indoor air research to be appropriate and the program very successful in terms of peer-reviewed publications and participation in professional organizations as well as focused specialty conferences related to indoor air engineering research issues, and the research program's overall impact on the research field. These accomplishments are particularly noteworthy, especially considering the modest budget and in-house personnel resources devoted to this activity.

The IAERS encouraged the AEERL staff to explore how their research should rely on and interact with other government and private research programs. The IAERS also recommended that a unified conceptual model should be developed to effectively inventory sources and sinks. A number of broad-ranging recommendations were made, with focus on improving an excellent existing research program, to address prevention of microbial contaminants and to improve technical outreach to particular target groups, such as allergy specialists, building designers, building operators and managers, homeowners, indoor air quality model users, and university researchers.

EPA-SAB-RAC-93-010 High-Level Radioactive Waste/Carbon-14 Release

At the request of EPA's Office of Radiation Programs, the High-Level Waste/Carbon-14 Subcommittee of the Science Advisory Board's Radiation Advisory Committee met June 16-17, August 3-4, and September 9-10, 1992 to review, "Issues Associated with Gaseous Releases of Radionuclides for a Repository in the Unsaturated Zone".

The Subcommittee's findings and recommendations address the inventory of carbon-14, the characterization of the mechanisms and release rates for gaseous carbon-14 from the wastes and waste containers, the description of the effectiveness of engineered barriers designed to reduce or impede releases, the description of the physical and chemical retardation and transport of carbon-14 from the waste repository to the surface, quantitative uncertainty analysis, the dichotomy of small individual doses and large population doses, and the need to consider the release of all radionuclides when seeking to optimize site selection

EPA-SAB-EHC-93-011 SAB/SAP Review of Cholinesterase Inhibition and Risk Assessment

In August, 1992, the EPA Risk Assessment Forum prepared a new draft policy document addressing key issues in assessing the risks from cholinesterase inhibitors. A Joint Committee of the Science Advisory Board and the Scientific Advisory Panel reviewed the document on November 5, 1992 in Washington, DC.

The Committee found that the draft document is generally supported by the underlying scientific data. Improvements could be made in the material addressing red blood cell (RBC) inhibition and the document revised to stress the need for better studies on the relevance of cholinesterase inhibition (erythrocyte, plasma and brain) measurements; methods to compare measurement results methods among laboratories; and the use of these measurements as biomarkers of exposure and correlates to data on clinical signs and symptoms. The document should consider the peripheral effects of anticholinesterases.

The Committee agrees that clinical effects associated with exposure to cholinesterase inhibitors can be used to establish benchmark doses and reference doses (RfD), but only in conjunction with other relevant toxicological information. The Committee also recommends

that the Agency's policy continue to include the use of blood cholinesterase data in the risk assessment process, and agrees that blood cholinesterase inhibition is a biomarker of exposure which offers crucial supporting data for confirming exposures and clinical signs.

EPA should evaluate the possibility that an RfD could be set based on clinical signs and symptoms associated with a significant inhibition of cholinesterase occurring at a specified dose. EPA should continue research to examine the correlation of clinical signs and erythrocyte cholinesterase inhibition.

EPA-SAB-RSAC-93-012 Recommendations on the 1992 Scientific and Technological Achievement Award Nominations

This report represents the conclusions and recommendations of the U.S. Environmental Protection Agency's Science Advisory Board regarding the 1992 EPA Scientific and Technological Achievement Awards (STAA) program. The STAA Subcommittee of the Science Advisory Board reviewed and evaluated the 137 papers nominated in eight scientific and technical categories for the 1992 STAA awards. The Subcommittee recommended 39 papers (28 percent of the nominations) for awards at three levels and also recommended to the Office of Research and Development (ORD) that six additional papers be recognized with honorable mention. The Subcommittee recommended awards for papers from ten EPA research laboratories and two offices within the ORD. The Subcommittee encouraged the Agency to continue support for the STAA program as a mechanism for recognizing and promoting high quality research in support of the Agency's mission.

EPA-SAB-EEC-93-013 Review of the Assessment Framework for Ground-Water Model Applications

The Modeling Project Subcommittee (MPS) of the Environmental Engineering Committee (EEC) of the Environmental Protection Agency's (EPA) Science Advisory Board (SAB) reviewed the Agency's Office of Solid Waste and Emergency Response (OSWER) draft guidance entitled "Assessment Framework for Ground-Water Model Applications," dated October, 1992. (hereafter cited as the Framework). The MPS met on January 14 and 15, 1993 and reviewed the Framework.

In accordance with its charge, the MPS review focused on the scientific correctness and completeness of the substance of the Framework; whether the Framework provides guidance to OSWER for managing model applications; and whether there is additional information or direction which should be added to improve the Framework.

The MPS strongly supports this effort and encourages the extension of this Framework, or the development of other frameworks, for additional types of model applications. The Framework represents a significant advance in OSWER's approach to the management and use of mathematical models in Superfund remediation planning.

In order to improve the usefulness and flexibility of the Framework and to reduce the likelihood that the Framework be used inappropriately, the MPS suggests the following: that the introduction be expanded to clarify intended users and uses; that graphic illustrations be added to emphasize feedback involved in the modeling process; that the Framework be distributed as a separate document; and that additional references be consulted in its revision. Particular language revisions are also recommended to improve clarity and comprehensiveness.

With revision, the MPS believes that the Framework will be a useful guidance document for OSWER management of ground-water model applications.

EPA-SAB-RAC-93-014 Review of Uncertainty Analysis of Risks Associated with Exposure to Radon--"Chafee-Lautenberg Multi-media Risk Study"

The Radiation Advisory Committee's reviewed the EPA's, "Uncertainty Analysis of Risks Associated with Exposure the Radon in Drinking Water " (January 29, 1993), related documents and public comment. The Committee reviewed the adequacy of the EPA's revisions of the risk assessment for both the ingestion and inhalation exposure pathways and the adequacy of the associated uncertainty analysis. The Committee also reviewed the EPA's estimates of risks associated with radon exposures due to releases from drinking water treatment facilities. In its review, the Committee was mindful of its previously expressed concerns regarding a) the lack of quantitative uncertainty analyses, b) failure to consider direct exposure to radon and its progeny released by showers, c) lack of an assessment of risks associated with drinking water treatment, and d) no consideration of potential occupational exposures and risk.

Overall the review finds that EPA has adequately addressed most of the issues raised in earlier reports from the Committee. The quantitative uncertainty analysis developed by the EPA represents a methodology that is state-of-the-art and significantly improves the scientific basis for the EPA's decision-making. The Committee also finds that the revised estimates for ingestion and inhalation risks due to radon in drinking water are scientifically acceptable. The Committee is concerned, however, that the uncertainties in the estimate of ingestion risk may be larger than suggested by the quantitative uncertainty analysis. The Committee recommends that the EPA incorporate a qualitative discussion of known but not quantified uncertainties in its analyses and that given the larger uncertainty bounds associated with the ingestion risk, that consideration be given to keeping the ingestion and inhalation risks separate in the EPA's deliberations on standards for radon in drinking water. The Committee also reiterated its previously stated concerns that the overall risks associated with radon in drinking water are small compared with the average radon exposures due to indoor air and that the drinking water risks be placed in context in the summary documents developed by the EPA.

In its review, the Committee also provided comments and recommendations regarding the adequacy of the analysis and the approaches taken. Among these was the recommendation that the EPA look at a range of water treatment technologies and include in the analyses

risks due to occupational radiation exposures and potential waste disposal issues. Finally, the Committee also recommends that particular attention be given the uncertainties associated with the variance and shape of the probability density functions used by the EPA to represent variability of exposures among individuals.

EPA-SAB-DWC-93-015 Review of issues related to the cost of mitigating indoor radon resulting from drinking water.

The Radon Engineering Cost Subcommittee (RECS) of the Drinking Water Committee (DWC) of the EPA Science Advisory Board (SAB) has reviewed the Agency's approach to the costs of radon control or mitigation experienced by households or communities. On February 8 and 9, 1993, the Radon Engineering Cost Subcommittee (RECS) of the SAB's Drinking Water Committee (DWC) conducted a focused review of the cost issues.

As part of its charge RECS evaluated EPA's approach for estimating the costs of mitigating indoor radon from drinking water in residences, assessed EPA's judgement on Best Available Technology (BAT) for central or well-head treatment for each size water treatment-facility category are appropriate, and reviewed cost estimates for design, operation, installation and maintenance of these technologies. The SAB also compared the cost-effectiveness of controlling radon exposure from drinking water with the costs of controlling other sources of indoor radon. "Effective," in this context, means the extent to which radon exposure is reduced by the treatment applied to produce significant improvements in health. These results can be normalized using calculated dose-effect values.

The Subcommittee determined that the EPA offices are employing a reasonable framework for estimating the cost-effectiveness of mitigating airborne indoor radon in residences. The approach for soil gases embodies standard Agency and industry methodology, and the cost data for testing and mitigation are based on a substantial body of data from actual practice and represent the consensus of industry experts.

The Subcommittee recommends that EPA invite more direct interaction with various water industry commenters regarding radon removal from drinking water in order to obtain better data on actual construction, operation, and cost estimating practice before making its independent judgements. Of particular concern were the representativeness of the data base on occurrence of radon in groundwater, the elements used to calculate costs of treatment unit operations, the effect of system size on unit costs, and the incidence and cost of disinfection after air stripping.

EPA-SAB-DWC-93-016**Review of the Agency's Revised Methodology for deriving National Water Quality Criteria (AWAC) for the protection of human health**

On February 9-10, 1993, the Drinking Water Committee of the Science Advisory Board (SAB) reviewed the Agency's revision of the methodology for deriving National Ambient Water Quality Criteria (AWQC) for the protection of human health.

The Committee was pleased to learn of the Agency's systematic effort to revise this methodology. They were critical of the emphasis given to point source discharges in the ongoing revision. They commented on the Agency's revision of its 1986 Cancer Risk Guidelines, on the need to incorporate mechanistic information in them, and on the Agency's treatment of Group C chemicals and uncertainty. They addressed issues of severity scales for non-cancer effects, the development and allocation of RfD values, the use of short-term study data, Health Advisory Doses, and the benchmark dose. They reviewed the Agency's use of Bioaccumulation Factors (BAFs) and Bio-concentration Factors (BCFs), the use of MCLGs (Maximum Contaminant Level Goals) in AWQC methods, and the use of separate criteria for drinking water and fish intake.

The Committee urged EPA to priority-rank the needs related to microbiologic exposures in and supported the use of new structures to assist EPA. They recommended exposure potential as the basis for microbiological criteria, and supported a risk-based approach to the regulation of microbes. They commented on the relationship of indicator organisms to non-GI illnesses, the efficacy of indicators in tropical waters, and research needs on determinants of virulence, injured pathogens, and molecular techniques for pathogen identification.

The Committee also reviewed the proposed use of a tiered approach to categorize data availability, and addressed issues concerning the categorization of Group C chemicals under this scheme.

LETTER REPORTS

EPA-SAB-RSAC-LTR-93-001**A Social Science Research Agenda**

The Research Strategies Advisory Committee met on January 20, 1992 to review the draft document "Stimulating Environmental Progress: A Social Science Research Agenda". The Committee applauded the Agency for taking this first step to integrate the social sciences into environmental decision making. The members of the group felt that the document presented a useful framework for considering social science issues in environmental protection. The Committee recommended the further integration of such activities with other environmental research and the establishment of a lead organization for its coordination.

EPA-SAB-IAQC-LTR-93-002**SAB Review of the Risk Assessment Forum's Draft Showering with VOC Contaminated Tap Water**

On February 24-25, 1992, the Indoor Air Quality and Total Human Exposure Committee (IAQTHEC) of the Science Advisory Board met to review the Office of Research and Development's (ORD) proposed guidance on showering with tap water which may have been contaminated with volatile organic compounds (VOC) (the document was entitled: Project Summary - Guidance on Estimating Exposure to VOC's During Showering). Although the Committee believes that the draft document represents a good start towards developing guidance to be used by Regional EPA risk assessors in responding to public concerns, the Committee believes the draft will still need significant improvement before being used as a final document. The Committee noted that the scientific basis for anything but general advice in this case is extremely limited. As with many public health concerns, vague generic advice may be misleading and inappropriate for many specific situations that arise. Nevertheless, the Committee was pleased to note that the Agency seeks to include non-ingestion exposure pathways when assessing risk to VOC, which, under certain circumstances, can dominate total human exposure. Guidance to help identify the circumstances where, for example, the inhalation hazard from volatilized agents can exceed the ingestion hazard is clearly needed by risk assessors. In addition, there are many factors that affect the total dose of VOC received from showering, including water temperature, droplet size, room size, shower duration, and number of showers per day. The latter could be important considerations for teenagers, and other segments of the population. The Committee also suggested that there is also a need to provide easily accessible information to other public officials and the public who are also concerned about such instances. It is not only important that the various EPA regions give consistent advice, but that the advice by EPA in a given region is consistent with that given by the local health departments.

EPA-SAB-IAQC-LTR-93-003**SAB Review of the Risk Assessment Forum's Draft Guidance on Assessing Health Risks of Gasoline Vapors in Buildings**

On February 24-25, 1992, the Indoor Air Quality and Total Human Exposure Committee (IAQTHEC) of the Science Advisory Board met to review the Office of Research and Development's (ORD) proposed guidance on assessing health risks of gasoline vapors in buildings (entitled: Regional Guidance on Assessment of Health Risks Associated with Gasoline Vapors in Buildings). Although the Committee believes that the draft document represents a good start towards developing guidance to be used by Regional EPA risk assessors in responding to public concerns, the Committee believes the draft still needs significant improvement. The Committee notes that the scientific basis for anything but general advice in this case is extremely limited. As with many public health concerns, vague generic advice may be misleading and inappropriate for many specific situations that arise. The Committee also suggested that there is also a need to provide easily accessible information to other public officials and the public who are also concerned about such instances. It is not only important that the various EPA regions give consistent advice, but that the advice by

EPA in a given region is consistent with that given by the local health departments. The Committee also provided some specific advice in their report.

EPA-SAB-RAC-93-LTR-004

Evaluation of EPA's Proposed Methodology for Estimating Radiogenic Cancer Risk

In a memorandum dated January 13, 1992, Margo T. Oge, Director, Office of Radiation Programs, asked the Science Advisory Board to review EPA's revised methodology for estimating human cancer risks from exposures to ionizing radiation. The charge for this review requested the SAB to respond to the following four questions:

1. Has the Agency analysis considered the most relevant risk estimates of low-LET radiation?
2. Does the Agency analysis accurately compare the most relevant features and assumptions of the various models?
3. Is the Agency's analysis technically sound?
4. Are the recommended methods for estimating the cancer risks appropriate and supportable in light of the current scientific evidence?

In addition to the charge, the ORP initially provided the SAB with extensive background material. On May 1, 1992, ORP provided the SAB with a follow-up document titled "Proposed Methodology for Estimating Radiogenic Cancer Risk."

In the opinion of the Radiation Advisory Committee EPA has reviewed and considered all major new data sets and current risk estimates of low-LET ionizing radiation. Although no single data set and model for predicting radiogenic cancer risk is ideal, the method of analysis chosen by EPA is adequately supported by present scientific evidence. A few areas of uncertainty exist that eventually may require modification of the Agency's analysis when further data become available. Among these is the method for utilizing ("transporting") risk estimates from the atomic bomb survivor study in Japan where the base-line risks for several cancers differ significantly from those in the U.S. Another is the question of whether to apply a "Dose Rate Effectiveness Factor" (DREF) for solid tumors at low dose rates or at low doses of low-LET radiation; the Agency's choice of a DREF of 2 is in accord with the current choice of other radiation protection groups world-wide. An additional concern is the continuing uncertainty in the dosimetry for the Japanese atomic bomb survivors including the magnitudes of the neutron components. Further discussion of these and other issues is contained in the subsequent parts of this Letter Report.

EPA-SAB-EEAC-LTR-93-005

SAB Comments on the Office of Management and Budget's "HEALTH-HEALTH" Concept

On July 14-15, 1992, the Environmental Economics Advisory Committee (EEAC) meet in Arlington, Virginia and discussed the central premises of the health-health (sometimes referred to as risk-risk) concept, and the analyses and evidence supporting the tradeoff suggested by the concept. In its simplest form, health-health postulates that, under certain conditions, the cost of health and safety regulations reduce individual income/wealth, and thus reduce resources available to individuals for expenditures on a wide range of goods and services that contribute to the individual's health, including the purchase of health care. If the postulated relationship is valid, it is conceivable that a health/safety regulation could have a net negative effect on aggregate measures of the nation's health by reducing the income available to people to meet other needs. The Charge for the meeting posed four questions: a) How should these issues be addressed to support reviews and reauthorizations of laws covering Superfund, other hazardous waste cleanups and clean water; b) Is the conceptual argument appropriate for decisions that require the government to protect health, regardless of costs (e.g., Primary National Ambient Air Quality Standards)?; c) Is research quantifying the health-health tradeoff worth pursuing? Which aspects of this issue should receive priority?; and d) Is the current research using the best methodology?

The Committee found that the first question (a) posed is so all-encompassing as to be outside the scope of this review. Regarding (b), the logic underlying a health-health analysis is sound, although as currently envisioned it would only have narrow applications; furthermore, there is not presently a sufficient basis, even for such narrow applications, for determining whether the effect of income changes on health is significant or for estimating its magnitude. *Vis-a-vis* (c), additional exploration and analysis is warranted, ideally utilizing a longitudinal data set so that changes in health status (morbidity and mortality) could be measured and related to changes in income while controlling for other important factors. The research question (d) poses problems. It would be inappropriate to describe the published efforts to date as "research," hence this question can not really be answered.

EPA-SAB-CAACAC-LTR-93-006

CAACAC Review of the retrospective study of the impacts of the Clean Air Act.

On December 22, 1992, the Clean Air Act Compliance Analysis Council (CAACAC) met to address a variety of issues related to the retrospective and prospective Clean Air Act (CAA) impact studies required by Section 812 of the CAA amendments of 1990.

Major topics addressed and the Council's findings were: 1) Estimation of Costs and Macromodeling--the basic approach being followed is sound. The data on direct costs and the use of those data in the modelling process appear to be generally sensible. The main exception is the treatment of mobile source pollution control costs. 2) Emissions Modeling--in general, the Council believes that it is appropriate to estimate emissions by linking an integrated model set of sectoral models to a general equilibrium macro model. We urge the

Agency to seek ways to use existing data sets to improve the credibility and likely performance of the Trends methodology in this study. The Council strongly prefers the assumptions and approach (including, in particular, the treatment of State Implementation Plans (SIP) and state-by-state calibration) underlying the ICF, Inc. Coal and Electric Utilities Model (CEUM) analysis to those that shaped the Argonne Argus Model work on electric utilities. The Council is particularly concerned that emissions of air toxics be treated carefully. 3) Uncertainty Analysis--We commend the Agency for its intention to produce a report that includes quantitative measures of uncertainty associated with each major component of the analysis, identification of key policy-relevant uncertainties, and implications for the aggregate level of uncertainty associated with the final net benefit levels. The Council urges the Agency not to neglect in its analysis or presentation those elements of uncertainty that cannot easily be quantified. We recommend that the Agency not rely heavily on the hierarchically partitioned assessment (HPA) model in this study. 4) Estimating Economic Benefits & Damages--the Council reviewed three draft studies constituting surveys of the main areas pertinent to benefit assessment for the Clean Air Act. The three studies together review estimates of the values of reduced mortality, reduced morbidity, improved visibility, improved surface water quality, improved crop yields, reductions in forest decline, and reductions in materials damage. Overall, the Council believes that these reports performed a useful function in providing an overview of the literature in the benefits area. To be of greater assistance to EPA, the most important additions to these studies would be more refined assessments of the merits of the past benefit studies and increased discussion of the open issues that have not yet been resolved in a manner that would provide EPA with a sound basis for benefit assessment.

EPA-SAB-CAACAC-LTR-93-007

CAACAC review of the retrospective and prospective studies of the impacts of the Clean Air Act

On March 25, 1993, the Clean Air Act Compliance Analysis Council (CAACAC) met to address a variety of issues related to the retrospective and prospective Clean Air Act (CAA) impact studies required by Section 812 of the CAA amendments of 1990.

The Council addressed three major topics: a) Estimation of Costs and Macromodeling--the Council was very impressed by the progress made in addressing concerns raised in earlier reviews, particularly in modifying the use of the Gross Domestic Product as a measure of economic cost; the treatment and presentation of direct and indirect costs; the clearer distinction between endogenous technical change (ETC) and factor substitution (FS); the introduction of alternative assumptions about net capital flows from abroad; and the analysis of the use of alternative cost estimates produced by other U.S. government agencies. b) Health Effects of Lead and Other Air Toxics--the Council urged the EPA to develop methods to deal with a range of important toxics that are not carcinogens, and to develop and apply the methods necessary for an analysis based on measures of central tendency, not 95% upper bound limits. Further, risk estimates for cost/benefit analysis should be based on estimates of actual exposures, rather than the worst case scenarios often employed in regulatory contexts. The Agency is advised to take full advantage of the large amount of research that has been done on lead. The lessons from these analyses that can be applied to evaluations of the

exposures and effects of other pollutants. The Council believes it was appropriate to review contingent valuation (CV) studies eliciting willingness-to-pay for avoiding exposures to carcinogens; such studies might serve either to corroborate or to correct estimates of the value of a statistical life (VSL) derived from hedonic wage studies. In view of the state of the CV literature, however, the CAACAC recommends that statistical lives saved as a result of air toxics control be valued using hedonic techniques. c) Design of the Prospective Assessment--the Council recommends that the Agency should learn from the retrospective study that as a rule, resources are better spent on developing sound, comprehensive data relevant to key issues than on elaborate modeling or literature review efforts.

EPA-SAB-EEC-LTR-93-008 Review of Draft Agency Guidance for Conducting External Peer Review of Environmental Regulatory Modeling

The Modeling Peer Review Subcommittee (MPRS), along with its parent Environmental Engineering Committee (EEC) of the Science Advisory Board (SAB) has prepared a letter report on its March 3 and 4, 1993 review of the draft, entitled "Agency Guidance for Conducting External Peer Review of Environmental Regulatory Modeling." This draft guidance was prepared by an ad hoc Agency Task Force on Environmental Regulatory Modeling (ATFERM), which was created under the Agency's Risk Assessment Council.

The MPRS was asked to determine how well the guidance addresses its goal of being a resource for Agency managers implementing external peer review of environmental regulatory modeling, as well as if the guidance provides the proper balance between being too restrictive versus not providing enough detail. The MPRS found that, in general the guidance provides an appropriate level of detail in the guidelines for specific elements to be addressed by the reviewer, but that more detailed guidance is needed on the mechanics of the review process.

With regard to the general peer review process, the MPRS cited an omission on what should happen after the external peer review process is completed, in order to rectify issues raised in the peer review. With regard to the model peer review process, the MPRS cautioned that while there is a good balance between being over and under prescriptive, the Agency was urged not to become overly prescriptive, where the guidance could become de facto regulation.

The MPRS stressed the importance of documenting the entire peer review process. Among the recommendations made, the MPRS also stressed that specific guidance was needed on what constitutes a "qualified" peer reviewer, that the model should be verified against available data in the range of conditions of interest, that there is a role for peer review to insure that model results are not misused, and that the decision is consistent with the modeling effort. The MPRS also recommended that some form of the ATFERM should continue to exist, a model-coordinating activity within the Agency is needed on a continuing basis, and the Agency should consider making the peer-review guidance into policy.

EPA-SAB-EEC-LTR-93-009 Review of Superfund's Strategic Plan for Groundwater Remediation

The EPA Science Advisory Board's Environmental Engineering Committee reviewed the OSWER/Office of Emergency and Remedial Response's draft Strategic Plan for Ground-Water Remediation at Superfund Sites through the Superfund Ground Water Remediation Subcommittee.

While the Subcommittee commends OERR for undertaking this critical effort, it noted that the document does not contain all the elements commonly contained in a strategic plan: a vision, an assessment of the current state of knowledge, and a pathway for moving from the current state to realization of the vision.

The EPA should focus on why it developed the strategic plan and tailor the goal and objectives accordingly. It appeared to the Committee that the EPA collapsed issues and projects currently being acted on into the plan, and the Committee questions whether the plan is responsive to changes in the Superfund program, particularly SACM. There is a need to identify problems and their solutions within the program and it is suitable that this be an internal EPA action or planning process.

The Committee notes one additional difficulty with the strategy--the coupling of technology and policy in attempting to set priorities may frustrate the effort and weaken its credibility. While technical decisions may be altered by policy, it would seem prudent to separate these two issues to allow development of independent decisions, compare the outcomes, and then attempt some resolution.

The Subcommittee does agree with what it believes to be the main thrust of the document--that of encouraging development of methods suitable to a variety of clean-up scenarios. The plan recognizes that clean-up goals depend upon the human health and ecological risks included, technical treatability, costs, and values of various resources affected. The Subcommittee's response to the three questions of the charge follows.

In summary, the Subcommittee is pleased that the EPA has attempted to develop a strategic plan for a critical national program with great economic impact. The Subcommittee is also pleased that the draft document incorporated many suggestions made in the October 1992 consultation and that the overall technical thrust of the document is appropriate to the complex situation of site cleanup. While the draft document was not yet a true strategic plan, the problems seen here are very common ones, and further clarification and refinement are needed. The Subcommittee has suggested some refinements and improvements which it hopes OSWER will incorporate into the revised document.

EPA-SAB-EC-LTR-93-010 SAB Review of Multimedia Risk and Cost Assessment of Radon in Drinking Water

The Chafee-Lautenberg Study Review Committee of the Science Advisory Board (SAB) reviewed and EPA report to Congress entitled "Multimedia Risk and Cost Assessment of Radon in Drinking Water". This review complemented two other Committee reviews of uncertainty for radon risk assessments and the costs of mitigation of radon risks in water. This Committee identified four areas of concern: a) the estimates of the exposed populations were uncertain; b) the risk estimation procedures were valid, but the estimates of risk from ingested radon were indirect; c) the estimated costs of mitigation were also uncertain; and d) the regulatory assessment did not compare the relative costs associated with options for reducing radon risks from indoor air. The SAB recommended that EPA undertake additional research on radon mitigation measures and enhance its data base on the occurrence of radon in groundwater to reduce the primary sources of uncertainty and reduce the costs associated with reducing the overall risks of exposure to radon.

EPA-SAB-CAACAC-LTR-93-011 Prospective study of the impacts of the Clean Air Act.

On June 8, 1993, the Clean Air Act Compliance Analysis Council (CAACAC) met to address a variety of issues related to the design of the prospective Clean Air Act (CAA) benefit/cost studies required by Section 812 of the CAA amendments of 1990. As a general point, the Council urged the Agency to continue to reflect on the ultimate purpose of this activity. The number of objectives the study is to satisfy should be minimized to reduce the uncertainty and cost of the effort.

The meeting addressed : a) Baseline Definition--The Council feels that it would be undesirable to employ in the prospective study the "no CAA" baseline used in the retrospective study. Rather, the counterfactual world used as a baseline should be one in which the 1990 CAA Amendments were not enacted. In any case, baseline emissions should vary over time in response to economic changes consistent with those employed in predicting actual future emissions; we do not believe it would be plausible to hold emissions constant at 1990 (or any other) levels. b) Benefit and Cost Analysis--The Agency staff is grappling with this problem seriously and effectively. In assessing changes in risk for benefit analysis purposes, attention should center on mean or median values, not on the 95th percentile or similar extreme values that are generally employed for regulatory purposes. Thus meta-analysis techniques are more appropriate for combining the results of multiple studies in this context than methods that concentrate on studies with extreme results. In terms of cost analysis, we are comfortable with the staff's proposal to stress detailed analysis of a relatively few critical sectors rather than analysis of economy-wide general equilibrium effects. We also believe it is likely to be critically important to analyze carefully the positive and negative impacts of the 1990 CAA Amendments on technology, and this can best be done at the industry level. c) Uncertainty--the Council believes that the prospective study must make clear how scientific, economic, and other uncertainties translate into uncertainty regarding costs and benefits. We are pleased that the staff is sensitive to this issue and strongly support their view that the

management and analysis of uncertainty must be a central focus of the entire research effort. We agree that because uncertainties regarding the effects of emissions are particularly important, a good deal of the analysis of uncertainty can be done through post-emissions-model sensitivity analyses to alternative assumptions regarding such things as alternative emissions-exposure and exposure-response functions and alternative valuation approaches. But we would urge the Staff not to lose sight of the potentially important uncertain variables affecting emissions and costs -- including economic growth, relative prices of natural gas and gasoline, and costs of air toxics control.

EPA-SAB-EPEC-LTR-93-012**Review of the Research Program for Environmental Release of Biotechnology Products**

The Biotechnology Research Review Subcommittee of the Science Advisory Board's (SAB) Ecological Processes and Effects Committee met on February 18-19, 1993, at the Gulf Breeze Environmental Research Laboratory to review the Agency's biotechnology research program. The Subcommittee reviewed the draft "Environmental Release of Biotechnology Products Research Plan" (dated May 29, 1992) and other supporting documentation to evaluate both the ongoing research and the proposed future direction for the biotechnology research program.

The Subcommittee concluded that the Agency has done an excellent job of defining the major issues surrounding the release of genetically engineered microorganisms (GEM) into the environment, and has formulated a comprehensive research plan to address these issues. The panel felt, however, that the plan was overly ambitious and lacked priorities. The Subcommittee recommended that future research focus primarily on identifying new, more sensitive, ecological endpoints for effects, and understanding the fate of specific introduced organisms or genes. In addition, the group felt that the research program should take greater advantage of relevant non-GEM models for assessing health and environmental effects, explore opportunities for collaborative research and data-sharing with industry and other federal agencies, and assess the potential human health risks from transgenic crop plants. Areas of research deemed by the Subcommittee to be low priority included biological containment via introduction of lethal genes (which the panel felt was ineffective and potentially riskier than the organism to be controlled), evaluation of toxic intermediates from bioremediation (already under study by NIEHS), and engineering risk control technologies for large scale manufacturing use of GEMs.

EPA-SAB-EEC-LTR-93-013 Review of the Global Climate Change Engineering Research and Development (R&D) Program

The Global Climate Change Engineering Research Subcommittee of the Environmental Engineering Committee of the Science Advisory Board has prepared this letter report on its May 26 and 27, 1993 discussions and review of the draft document entitled "Global Climate Change Engineering Research and Development (R&D) Program," dated April 1993.

The Subcommittee was charged to evaluate the U.S. Environmental Protection Agency (EPA) Office of Research and Development (ORD), Air and Energy Engineering Research Laboratory (AEERL) present and proposed future approach to global climate change engineering research in terms of their rationality, scientific soundness, rigor and practicality.

The Subcommittee found the existing Global Climate Change Engineering R&D Program to be rational, scientifically sound, practical and supportive of EPA's role, and that the individual projects were appropriate to the capabilities of the laboratory and the qualifications of its personnel. The existing focus on increasing point sources of methane emissions, and on sources controllable by engineering solutions is recommended for expanded emphasis and development.

The Subcommittee also made recommendations for further development of the Global Emissions Data Base (GloED), inventories on methane emissions from natural gas and coal industries, efforts toward coal bed methane recovery, demonstration of fuel cells for control of waste methane emissions, studies on conversion of biomass to energy, production of transportation fuel, and a systematic prioritization of risks in developing research opportunities for any expanded future program.

EPA-SAB-CASAC-LTR-93-014 Review of the Alternative Fuels Research Strategy

The Clean Air Scientific Advisory Committee *(CASAC) of EPA's Science Advisory Board (SAB) met on June 29 and 30, 1993, to review the Office of Research and Development's (ORD's) draft strategy for research on alternative fuels. The Committee was pleased with this attempt to capture the mix of research and development activities necessary to assess alternative fuels. The Committee made a number of substantive comments on the technical content of the document, emphasizing its major comment on the overall concept --- the allocation of adequate resources for such an effort will determine its success or failure prior to its implementation.

EPA-SAB-CASAC-LTR-93-015 Review of the Agency's Action for NO_x Closure

The Clean Air Scientific Advisory Committee (CASAC) of EPA's Science Advisory Board (SAB) at a meeting on July 1, 1993, completed its review of the draft document entitled "National Ambient Air Quality Standards for Oxides of Nitrogen (NO_x)". The Committee noted with satisfaction the improvements made in the scientific quality and completeness of the criteria document, and that it had been modified in accordance with the recommendations made by the Committee in April, 1993. The Committee noted that the document had organized the relevant information in a logical fashion and the Committee believes that it provides a scientifically adequate basis for regulatory decisions on oxides of nitrogen based on present scientific data on health effects of such exposure.

COMMENTARIES**EPA-SAB-RAC-93-COM-001****Radon Mitigation Research Preliminary Findings**

The Radon Science Initiative Subcommittee of the Science Advisory Board's (SAB) Radiation Advisory Committee identified three broad areas of concern in the radon field for which additional research appears to be needed:

1. Radon exposure and risk assessment
2. Radon risk control/reduction/mitigation strategies
3. Radon risk communication

The Subcommittee strongly believes that a credible radon research program requires that all three of these areas be addressed by EPA or other agencies. The Subcommittee believes this is particularly true because of the recommendations set out in the SAB document Reducing Risk: Setting Priorities and Strategies for Environmental Protection, which argues that resources be allocated on the basis of opportunities for the greatest risk reduction. In this regard, the Subcommittee is concerned that funding within the Office of Research and Development for additional research on mitigation of radon risk appears to have been reduced to zero. This would create a void in further radon mitigation research that would not be easily filled by current or planned research activities in other agencies.

Although the Radon Science Initiative Subcommittee will not develop an initial report until later in 1993, it is clear at this point that the report will include a strong recommendation that research is needed in all three of these major radon research areas. The decision to discontinue funding by the Agency for radon control research would, in addition to terminating efforts with substantial risk reduction potential, effectively disperse the expertise developed within the Agency of the course of a ten-year period.

EPA-SAB-DWC-93-COM-002**Commentary on "Requirements for Nationwide Approval of New and Optimally Revised Methods for Inorganic and Organic Analyses in National Primary Drinking Water Regulations Monitoring"**

On April 19, 1993, the Drinking Water Committee of EPA's Science Advisory Board (SAB) received a briefing concerning the "Requirements for Nationwide Approval of New and Optionally Revised Methods for Inorganic and Organic Analyses in National Primary Drinking Water Regulations Monitoring" (Revision 1.1, dated 4/14/93).

The Committee found the number of drinking water sources in the revised methods too small to adequately represent the nation's diversity in water quality and treatment conditions and recommended that certain water quality variables be included in the criteria for choosing sources to sample. They recommended that methods be tested at concentration levels that

take into account the dynamic range of possible concentrations on a case-by-case basis. They expressed concern about approving methods with detection capabilities very near the MCL, because of possible loss of valuable monitoring data. They also recommended that the scientific merits of a performance-based standard approach be provided to the Committee with appropriate time for a detailed review of the approach and its potential impact on the industry.

EPA-SAB-EC-COM-93-003 Interim response on the SAB review of Agency's Chafee-Lautenberg study of the risks from radon exposure and the costs of mitigating such risks

The Science Advisory Board agreed to review the Agency's study ["Chafee-Lautenberg (C-L) Study"] and submit a recommendation to the Administrator on its findings not later than July 31, 1993. The SAB will transmit three reports to the Administrator that deal with the Congressional request: a) The SAB's Review of the Uncertainty Analysis of Radon Risk, b) The SAB's Review of Costs of Mitigating Indoor Radon c) The SAB's Review of the Agency's C-L Study

EPA-SAB-CASAC-COM-93-004 Ozone Criteria Document Development Schedule

CASAC advised the Agency to provide high quality documents to the SAB in order maintain their schedule for proposing an ozone criteria.

EPA-SAB-EPEC-COM-93-005 Decreasing Research and Management Activity in the Coastal Environment

In July 1993, the Ecological Processes and Effects Committee of the Science Advisory Board wrote to the Administrator to express serious concern over the Agency's apparent decreasing research and management activity in the coastal environment. The Committee cited decreases in the funding requested in the FY94 budget for coastal programs, and the fragmentation of coastal research and management among several offices within the Agency. The Committee felt that coastal ecosystems deserve priority attention from the Agency, in part because of the increasing pollutant loads from growing urban/suburban population centers in coastal areas, as well as the ecological linkages between coastal and upland ecosystems. The Committee urged the Administrator to take a leadership role in the protection of coastal and marine ecosystems, utilizing the Agency's extensive regulatory authority over point and nonpoint sources of pollution, and ensure that these regulatory programs are supported by a strong scientific research effort. The Committee recommended that research focus on better understanding the sources, stress regimes, and transport, fate, and effects of anthropogenic substances, bacteria and viruses in estuarine and marine systems. Such research will provide the fundamental understanding of the various stressors to support environmental risk assessments for coastal areas.

EPA-SAB-RAC-93-COM-006

Quantitative Uncertainty Analysis for Radiological Assessments

The Radiation Advisory Committee (RAC) has on numerous occasions expressed its strongly held view that the EPA should incorporate uncertainty analysis as a routine part of its scientific work. Incorporating uncertainty analysis in its scientific work is a necessary element of the scientific support for policy actions undertaken by the EPA.

Quantitative uncertainty analysis should be an integral part of performing human health and ecological risk assessments for toxic chemicals, radionuclides, physical stressors, and biotic stressors. Uncertainties associated with both exposure and effects must be accounted for in risk assessments and subsequent risk management decisions and communications. Approaches developed and used by the offices identified above in their analysis of quantitative uncertainties associated with radon risks have application to risk assessment activities in a variety of EPA program offices.

The commentary highlights a few elements that will aid the EPA to perform the quantitative aspects of uncertainty analysis: databases, computer software, and general guides to quantitative uncertainty analysis that are applicable to exposure, dose, and risk assessment.

The SAB strongly encourages the increased use of uncertainty analysis as exemplified by its recent use in analyzing the cancer risks of radon in drinking water. In approximately one year the Science Advisory Board would like to receive an update on how uncertainty analysis has been used by the Agency across its programs.

APPENDIX H

PROCEDURES FOR PUBLIC DISCLOSURE AT SAB MEETINGS

Background

Conflict-of-interest (COI) statutes and regulations are aimed at preventing individuals from (knowingly or unknowingly) bringing inappropriate influence to bear on Agency decisions which might affect the financial interests of those individuals. The SAB contributes to the decision-making process of the Agency by evaluating the technical underpinnings upon which rules and regulations are built. SAB members and consultants (M/Cs) carry out their duties as Special Government Employees (SGE's) and are subject to the COI regulations.

Therefore, in order to protect the integrity of the SAB process itself and the reputations of those involved, procedures have been established to prevent actual COI and minimize the possibility of perceived COI. These procedures include the following:

- a. Having SAB M/C's regularly file SF-450, Confidential Financial Disclosure Report. This form is a legal requirement and is maintained by the Agency as a confidential document.
- b. Providing SAB M/C's with written material; e.g., "Ethics in a Nutshell" and various EPA Ethics Advisories
- c. Delivering briefings to M/C's on COI issues on a regular basis.

The following is a description of an additional voluntary¹ procedure that is designed to allow both fellow SAB M/Cs and the observing public to learn more about the backgrounds that SAB M/C's bring to a discussion of a particular issue. In this way, all parties will gain a broader understanding of "where people are coming from" and provide additional insights to help observers and participants evaluate comments made during the discussion.

¹ Note: The disclosure procedure is voluntary, and members/consultants are not obligated to reveal information contained in their Form 450 that would otherwise remain confidential.

Procedure

When an agenda item is introduced that has the potential for COI--actual or perceived--the Designated Federal Official (DFO) will ask each M/C on the panel to speak for the record on his/her background, experience, and interests that relate to the issue at hand. The following items are examples of the type of material that is appropriate to mention in such a disclosure:

- a. Research conducted on the matter.
- b. Previous pronouncements made on the matter.
- c. Interests of employer in the matter.
- d. A general description of any other financial interests in the matter: e.g., having investments that might be directly affected by the matter.
- e. Other links: e.g., research grants from parties--including EPA--that would be affected by the matter.

The DFO will also publicly refer to any waivers from the COI regulations which have been granted for the purposes of the meeting.

The DFO will assure that the minutes of the meeting reflect that fact such disclosures were made and, if possible, the nature of the disclosures. In addition, the minutes should describe any situations in which, in the opinion of the DFO, an actual or perceived COI existed and how the issue was resolved.

APPENDIX I

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. Randall Bond Mrs. Kathleen Conway Mr. Manuel Gomez Dr. K. Jack Kooyoomjian Mr. Samuel Rondberg Ms. Stephanie Sanzone

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. His vision is that the SAB will draw upon the nation's rich resources of technical talent to provide high-quality, independent, practical advice on technical issues confronting the Agency, the country and the world. He sees the SAB as an operating example of how government can benefit from technical advisory committees. To this end, he is actively establishing linkages to advisory groups in other agencies and in other countries.

Dr. Barnes came to the SAB from 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 for more than a decade as practitioner, reviewer and instructor. For example, he participated in the White House's Office of Science and Technology Policy-led effort to produce a consensus view of cancer in the Federal government; i.e., Cancer Principles. He has been active in the writing of a number of the Agency's risk assessment guidelines; e.g., 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. He is former Coordinator for and currently a Member of the EPA Risk Assessment Council, the group charged with reviewing the policy aspects of scientific positions on risk. He also serves on the Council of Science Advisors in the Agency. In a tangential activity with the Office of International Affairs, he is working with the government of Bulgaria to inculcate risk-based decision making in their emerging environmental protection program, both at the ministry and regional levels.

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 the Institute of Molecular Biophysics at Florida State University, and subsequent graduate courses in several health-related areas; i.e., pharmacology, toxicology, immunology and epidemiology. His real world education continues to be provided by Dr. Karen K. Barnes and their two sons.

MR. A. ROBERT FLAAK

Assistant Staff Director

**Designated Federal Official (DFO) for the ad hoc Industrial Excess Landfill (IEL) Panel
and the Environmental Futures Committee**

MR. A. ROBERT FLAAK has served as the Assistant Staff Director since January 1991, overseeing the committee operations of the Board. He has been a Designated Federal Official (DFO) at the SAB for over ten years, serving as DFO for the following: Clean Air Scientific Advisory Committee (CASAC) (1978-1979; 1984-1991); Indoor Air Quality/Total Human Exposure Committee (IAQC) 1986-1993; Drinking Water Committee (DWC) (1991-1993); ad hoc IEL Panel (1992-present); Environmental Futures Committee (1993-present); and a host of SAB subcommittees and working groups involved with issues such as global climate and biotechnology.

Mr. Flaak serves as an Instructor for the General Services Administration Course on Federal Advisory Committee Management. During the past four years, he has helped design and organize the course, including a complete course revision in 1993. Along the way, he has taught several hundred Federal workers how to run Federal Advisory Committees. Mr. Flaak's academic background and training is in the field of biological oceanography. He 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 and has over 12 years of experience as a trainer.

Mr. Flaak served (as a civilian) for five years with the U.S. Coast Guard Headquarters 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. His non-government professional positions include service 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 interests in estuarine and coastal ecology, phytoplankton dynamics, bivalve nutrition, and invertebrate mariculture.

His 27 years of military service (US Army) includes over three years of active duty with a tour in South Vietnam in 1968-69, and service during 1991 in Saudi Arabia, Kuwait and Iraq during Operation Desert Storm. He is currently the Assistant Deputy Chief of Staff-Logistics for the 352d Civil Affairs Command in Maryland, an Army Reserve Component of the 1st Special Operations Command at Ft. Bragg, NC. He lives with his wife, Dottie, and their eight-year old son, Chris in Fairfax, Virginia.

DR. EDWARD BENDER

Designated Federal Official for the Research Strategies Advisory Committee.

DR. EDWARD S. BENDER is the newly Designated Federal Official for the Research Strategies Advisory Committee, having previously worked with the Ecological Processes and Effects Committee.

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 eggshells from the aeries 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 for the Clean Air Scientific Advisory Committee**

MR. RANDALL BOND joined the Science Advisory Board staff in December 1990. Randy started with EPA as a student assistant to the Medical Science Advisor in 1976 while working on his undergraduate degrees in chemistry and biology. After finishing his undergraduate work at George Washington University, 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 a participant in the LEGIS (Congressional Fellowship) program, and served 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 for the 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 and later for the U. S. Environmental Protection Agency's Region I in 1974 where she worked in the wastewater treatment plant operations and maintenance program. 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 volunteers with the Society of Women Engineers on the University of California (Davis) SERIES project. SERIES is a science education program developed for use in informal educational settings.

MR. MANUEL GOMEZ

**Designated Federal Official for the Drinking Water Committee
Designated Federal Official for the Indoor Air Quality Committee**

MR. MANUEL GOMEZ joined the Science Advisory Board (SAB) in late 1992 as the Designated Federal Officer of the Drinking Water Committee and the Indoor Air Quality/Total Human Exposure Committee. He brought to the SAB a very diverse previous experience in the environmental and occupational health arenas, most recently with the National Cancer Institute (NCI), where he was active in exposure assessment research activities as part of an occupational epidemiology research group.

Prior to the NCI, Mr. Gomez served as Assistant Professor in the School of Health Sciences of Hunter College of the City University of New York, as an industrial hygienist with both state and federal agencies, as well as a consulting firm, and as a research leader with a public interest organization in New York. He is the author of a study of health and safety issues in the copper smelting industries, along with other publications in the scientific literature. In the mid-1980's, Mr. Gomez also served as the Executive Director of a civic organization engaged in a variety of public education and policy analysis activities on Capitol Hill.

Mr. Gomez has an undergraduate degree in Biochemistry from Harvard, a master's degree in Environmental Health Sciences from Hunter College of the City University of New York, and is now completing his dissertation for a Doctor of Public Health degree from the Johns Hopkins University School of Hygiene and Public Health. In the recent year, Mr. Gomez has been very active in the planning for an international conference on occupational exposure databases, sponsored by the American Conference of Governmental Industrial Hygienists, one of the professional organizations in which he is active.

DR. JACK KOOYOOMJIAN

Designated Federal Official for the Environmental Engineering Committee

Designated Federal Official for the Radiation Advisory 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 23 years of experience with environmental issues, including over 18 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 the landmark legislation known as the Resource Conservation and Recovery Act (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. From 1979 through 1988, Jack was very involved with the Superfund's Emergency Response program. He developed the multi-media hazardous substance reportable quantity regulations, and was also 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) [now known as the Water Environment Federation (WEF)] 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 WEF for extraordinary personal service in the water pollution control field. He served as Local Arrangements Co-Chair of WEF'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 WEF, where he has served in numerous capacities, including President.

This year, Jack was invited to participate in a trip to Armenia from April 12 through April 26, 1992. He received an honorary professorship for his work as part of

a five-person team from the United States to develop an environmental engineering bachelors program and to outline a master's curricula for the State Engineering University of Armenia (SEUA), which has over 23,000 students, as well as to assist in addressing the newly-independent republic of Armenia's environmental problems.

Closer to home, which he shares with his wife Gerry, and their three daughters, Jennifer (18), Melissa (13) and Jessica (11), 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, and as a Federal Employee Point-of-Light in May of 1992.

MR. SAMUEL RONDBERG

**Designated Federal Official for the Environmental Health Committee
Designated Federal Official for the Environmental Economics Advisory Committee
Designated Federal Official for the Clean Air Act Compliance Analysis Council**

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 US 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.

MS. STEPHANIE SANZONE**Designated Federal Official for the Ecological Processes and Effects Committee**

MS. STEPHANIE SANZONE has served as the Designated Federal Official for the Ecological Processes and Effects Committee since December 1992. Prior to joining the SAB staff, Ms. Sanzone spent 4 years with EPA's coastal programs in the Office of Wetlands, Oceans and Watersheds. In her role as coordinator for coastal programs in the Southeast, she provided oversight and assistance to National Estuary Program sites in the development of management plans for estuarine watersheds. Ms. Sanzone has also served as a legislative aide for environment issues in the U.S. Senate and South Carolina House of Representatives, and as a coastal resource specialist with the Coastal States Organization in Washington, D.C.

Ms. Sanzone received a B.A. in Biology, with a minor in chemistry, from the University of Virginia, and a M.S. in Marine Science from the University of South Carolina. Her thesis research examined the role of amino acids and hemolymph proteins in a crustacean's response to changing environmental salinity.