

United States
Environmental
Protection Agency

EPA Science Advisory
Board (1400A)
Washington, DC

EPA-SAB-03-011
August 2003
www.epa.gov/sab

EPA SCIENCE ADVISORY BOARD FY 2002 ANNUAL STAFF REPORT

EPA Science Advisory Board s FY 2002 Annual Staff Report

Ms. Vickie Richardson, Ms. Patricia Thomas and Ms. Priscilla Tillery-Gadson, Editors

U.S. Environmental Protection Agency
EPA Science Advisory Board

This report is a summary of activities of the U.S. Environmental Protection Agency Science Advisory Board Staff Office for Fiscal Year 2014. It was reviewed by the Board or the Agency, and should not be used to represent the views of either organization.

TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1 SAB Formation, Authority and Function	1
1.2 SAB Organization and Membership	2
1.3 SAB Activities	4
1.4 SAB Products	5
1.4 Content of the Report	5
2.0 FY 2002 COMMITTEE ACTIVITIES	9
2.1 Executive Committee (EC)	10
2.1.1 Background	10
2.1.2 Activities	11
2.1.3 Products	11
2.2 Advisory Council on Clean Air Compliance Analysis (COUNCIL)	12
2.2.1 Background	12
2.2.2 Activities	12
2.3 Clean Air Scientific Advisory Committee (CASAC)	13
2.3.1 Background	13
2.3.2 Activities	13
2.3.3 Products	14
2.4 Drinking Water Committee (DWC)	15
2.4.1 Background	15
2.4.2 Activities	15
2.4.3 Products	16
2.5 Ecological Processes and Effects Committee (EPEC)	16
2.5.1 Background	16
2.5.2 Activities	16
2.5.3 Products	16
2.6 Environmental Economics Advisory Committee (EEAC)	17
2.6.1 Background	17
2.6.2 Activities	18
2.6.3 Products	18
2.7 Environmental Engineering Committee (EEC)	19
2.7.1. Background	19
2.7.2 Activities	19
2.7.3 Products	19
2.8 Environmental Health Committee (EHC)	20
2.8.1 Background	20
2.8.2 Activities	20
2.8.3 Products	20
2.9 Integrated Human Exposure Committee (IHEC)	21
2.9.1 Background	21

2.9.2	Activities	21
2.9.3	Products	21
2.10	Radiation Advisory Committee (RAC)	22
2.10.1	Background	22
2.10.2	Activities	22
2.10.3	Products	23
2.11	Research Strategies Advisory Committee (RSAC)	23
2.11.1	Background	23
2.11.2	Activities	24
2.11.3	Products	24

APPENDICES

APPENDIX A – SAB S STRUCTURE & AUTHORITIES	A-1
A1 Organizational Chart	A-2
A2 Introduction to Charters	A-3
A2.1 United States Environmental Protection Agency Charter	
EPA Science Advisory Board	A-4
A2.2 United States Environmental Protection Agency Charter	
Clean Air Scientific Advisory Committee	A-7
A2.3 United States Environmental Protection Agency Charter	
Advisory Council on Clean Air Compliance Analysis	A-10
APPENDIX B – SAB ACTIVITIES & PRODUCTS	B-1
B1 SAB Meetings for FY 2002	B-2
B2 SAB FY 2002 Products	B-5
B3 Abstracts of SAB Reports, Advisories, Commentaries and Workshop Reports	B-7
B4 SAB Reports and Notification of SAB Meetings	B-19
B5 Abstracts of the SAB Lecture Series	
Science & the Human Side of Environmental Protection	B-20
APPENDIX C – SAB PEOPLE	C-1
C1 SAB Staff Organization Chart	C-2
C2 SAB Committee Chairs	C-3
C3 Guidelines For Service on The EPA Science Advisory Board	C-7
C4 Types of Affiliation With The SAB	C-14
C5 SAB Members for FY 2002	C-16
C6 SAB Consultants for FY 2002	C-20
C7 Biographical Sketches of the SAB Staff	C-31

1.0 INTRODUCTION

This report is intended to provide and reveal the products of the EPA to a wide audience, to those both inside and outside the Agency. More specifically, the purpose of this Annual Report of the EPA Science Advisory Board Staff is two fold: a) To provide an introduction to the SAB; and b) To provide a summary of the SAB's activities for FY 2002.

1.1 SAB FORMATION, AUTHORITY AND FUNCTION

The SAB was established by Congress in 1978 by the Environmental Research, Development, and Demonstration Authorization Act (ERDDAA) (42 U.S.C. 4365). Since that time, the SAB has operated as an EPA Staff Office, reporting directly to the Administrator. Composed of non-Federal government experts, the SAB provides the Administrator with outside, independent advice on scientific, engineering, economics, and social sciences issues that impact the technical basis for EPA positions, including regulations, research plans, and the like. Generally, the SAB does not address policy aspects of problems confronting the Agency, since such matters are the jurisdiction and responsibility of the EPA Administrator.

In the context of the Agency's peer review policy, the SAB is EPA's most high-profile, public peer review mechanism. As a result, the most notable, most controversial issues often end up on the SAB's agenda.

The Agency's expressed intention is to base its positions on a solid scientific foundation. Over the past 25 years, the SAB has assumed growing importance and stature in this effort. It is now formal practice that many major scientific issues associated with environmental problems are reviewed by the SAB. For example, the

Clean Air Act Amendments of 1977 (CAAA) require that technical aspects of decisions related to all National Ambient Air Quality Standards be reviewed by the Clean Air Scientific Advisory Committee (CASAC), which is administratively housed within the SAB.

The SAB conducts its business in public view and benefits from public input during its deliberations. Through these public proceedings, Agency positions are subjected to critical examination by leading experts in various fields in order to test their technical merits. At the same time, the SAB recognizes that EPA is often forced to take a policy action to reduce an emerging environmental risk before all of the rigors of scientific proof are met. To delay action until the evidence is irrefutable might result in 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 for regulatory action. In such cases, 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.

In 1997, the Board declared its mission to be making a positive difference in the production and use of science at EPA. Therefore, in addition to generating high-quality peer reviews, the Board's activities also include providing counsel early in the Agency's product

development process, advice on needed research, unsolicited advice on technical topics that the Board feels should be brought to the Administrator's attention, and forums/workshops/seminars for broadening and leavening the Agency's thinking.

1.2 SAB ORGANIZATION AND MEMBERSHIP

The Agency has continually and successfully recruited top technical talent to fill its leadership positions. Those scientists and engineers who have led the SAB (and predecessor organizations) for the past 25 years are listed in Figure 1. Appendix C3 contains a list of the distinguished scientists, engineers, and economists who served as Chairs of the SAB Committees in FY 2002.

Figure 1. SAB Leadership Over the Past Two Decades

Executive Committee Chairs

2001-Present	Dr. William Glaze University of North Carolina
2001- 2001	Dr. Morton Lippmann (Interim Chair) New York University
1997-2001	*Dr. Joan Daisey Lawrence Berkeley National Laboratory
1993-1997	Dr. Genevieve Matanoski Johns Hopkins University
1988-1993	Dr. Raymond Loehr University of Texas-Austin
1983-1988	Dr. Norton Nelson New York University
1981-1983	Dr. Earnest Gloyna University of Texas-Austin
1979-1981	Dr. John Cantlon Michigan State University
1974-1978	Dr. Emil Mrak University of California

*deceased February, 2001

SAB Staff Office Directors

June 2002	Dr. Vanessa T. Vu
1988- 2002	Dr. Donald G. Barnes
1981-1988	Dr. Terry Yosie
1978-1981	Dr. Richard Dowd
1975-1977	Dr. Thomas Bath

The Executive Committee (EC) serves as the focal point to coordinate the activities of the Board's 10 standing committees. The organization of the SAB is depicted on Appendix A1. The EC regularly meets 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 the separately chartered CASAC and the Council are submitted directly to the Administrator, without need for prior Executive Committee review or approval. The charters for SAB, CASAC, and Council are found in Appendix A2.

Five Committees have historically conducted most of the EPA Science Advisory Board reviews:

- (a) Clean Air Scientific Advisory Committee (CASAC):
Mandated by the 1977 Clean Air Act Amendments
- (b) Ecological Processes and Effects Committee (EPEC)
- (c) Environmental Engineering Committee (EEC)

(d) Environmental Health Committee (EHC)

(e) Radiation Advisory Committee (RAC)

Between 1986 and 1990, five additional committees were added:

- (a) Integrated Human Exposure Committee (IHEC): Mandated by the Superfund Amendments and Reauthorization Act in FY 1986
- (b) Research Strategies Advisory Committee (RSAC): Requested by the Administrator in response to the Board's Future Risk report in FY 1988
- (c) Drinking Water Committee (DWC):
Evolved from the EHC in FY 1990
- (d) Advisory Council on Clean Air Compliance Analysis (Council): Mandated by the 1990 Clean Air Act Amendments
- (e) Environmental Economics Advisory Committee (EEAC): Requested by the Administrator in response to the Board's *Reducing Risk* report in FY 1990

The Board supplements the activities of

these Committees by establishing a variety of ad hoc Subcommittees as needed.

The Members of the SAB constitute a distinguished body of scientists, engineers, and economists and other social scientists who are recognized, non-federal experts in their respective fields. These individuals are drawn from academia, industry, state government, and environmental communities throughout the United States and, in some limited cases, other countries. As needed, the SAB also accesses experts via the route of Federal Expert and Invited Expert. These categories are described in greater detail in Appendix C5, Types of Affiliation with the SAB.

The number of Members is flexible. In FY 2002, SAB consisted of 107 members appointed by the Administrator for two-year terms, renewable twice. Service as Committee Chair can lead to as much as an additional four years of continuous service. A formal guideline on Membership service was adopted by the Executive Committee in FY 1993 and has been followed by the Administrator in making appointments (see Appendix C4).

More than 300 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 flexible, and their one-year terms can be renewed indefinitely. Consultants are required to meet the same standards of technical expertise as do the Members.

Appendices C6 and C7 contain a list of the FY 2002 SAB Members and Consultants (M/C), respectively. The M/Cs serve as Special Government Employees (SGEs) and are subject to all relevant Federal requirements, including compliance with the conflict of interest statutes

(18 U.S.C. Section 202-209).

The activities of the 400 M/Cs are supported by a Staff Director, Deputy Staff Director, Special Assistant, two Team Leaders (Committee Operations Staff (who also serves as a Designated Federal Officer (DFO), and the Committee Evaluation and Support Staff); five scientists/engineers who serve as DFOs, four administrative staff, four support staff, one detailee, and a National Older Workers Career Center Office Assistant (see Appendix C8 for Staff Biographies and Staff Transitions).

The SAB Staff works with the Agency to identify potential issues for SAB attention, focuses questions for review, works with the Board to identify and enlist appropriate Members and Consultants, interfaces between the Board and the Agency as well as with the public, coordinates logistics for reviews, and produces drafts of minutes and reports for submission to the Administrator.

1.3 SAB ACTIVITIES

As shown in Table I, the SAB's budget in FY 2002 totaled more than \$2.8 million. Table II and Table III show that these resources enabled the Board to conduct 43 meetings and to issue 22 reports (see Appendices B1 - B3). The increase in total costs over the years reflects an increase in the number of Board Members, increases in Federal pay and allowances, and general increases in the cost of airline travel, hotel and meeting accommodations.

The types of projects, as well as the range of subject matter, undertaken by the SAB continues to grow. The Board takes on activities at the request of Congress, the Administrator, and EPA's various 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.

SAB reports most often present the findings of peer reviews of nearly-completed Agency projects and contain considerable detail about the findings and recommendations of the Board. An SAB report is generally structured as a response to a formal Charge to the Board. The Charge is a set of specific questions, negotiated by the Agency and the SAB, that guide, but do not constrain, the review.

1.4 SAB PRODUCTS

Tables I, II and III display the SAB's operating expenses, meeting activity, report production, and staffing for the past five fiscal years (1998-2002).

In recent years the SAB has worked with the Agency to produce more timely advice that is focused at the front-end of the Agency's involvement with an issue. First, the Board can conduct the "Consultation" as a means of conferring, as a group of knowledgeable individuals, in public session with the Agency on a technical matter, before the Agency has begun substantive work on that issue. The goal is to leaven EPA's thinking by brainstorming a variety of approaches to the problem very early in the development process. There is no attempt or intent to express an SAB consensus or to generate a formal SAB position. The Board, via a brief letter, simply notifies the Administrator that a Consultation has taken place.

Second, the Board may conduct an "Advisory" as a means of providing, via a formal SAB consensus report, critical input on technical

issues during the Agency's position development process. In most instances, the topic of the Advisory will later be the subject of an SAB report, once the Agency has completed its work.

Third, most Reports are full-fledged peer reviews of essentially completed Agency products. Letter reports are similar in origin, content, and purpose to full reports. They are simply shorter; thereby generally resulting in more rapid advice to the Agency. Periodically the SAB will issue the results of a de novo other-than-peer-review project as an SAB report; cf. *Toward Integrated Environmental Decision Making* in FY 2000.

Fourth, the "Commentary" is a short communication that provides unsolicited SAB advice about a technical issue the Board feels should be drawn to the Administrator's attention.

Fifth, the Workshop denotes SAB Workshop seminars.

Appendix B2 details meeting activity and report preparation by Committee during FY01.

1.5 CONTENT OF THIS REPORT

This Report consists of two sections, plus appendices supplementing the discussion in the main sections. Following this Introduction (Section 1), Section 2 focuses on SAB Committee activities during FY 2002.

The Appendices contain important information, such as organizational charts, membership lists, abstracts of SAB reports, and summaries of SAB seminars.

Figure 2. SAB s Estimated Expenses (\$K) for Fiscal Year 2002

Table I

**Budget Totals for Fiscal Years 1998 - 2002
(In thousands of dollars)**

Fiscal Year	Staff Compensation	M/C Compensation	Total	Travel	Other Expenses	Total
1998	1,250	600	1,850	285	281	2,416
1999	1,318	630	1,948	308	298	2,554
2000	1,488	603	2,091	290	312	2,693
2001	1,505	615	2,120	310	365	2,795
2002	1,548	818	2,366	226	296	2,888

***Estimated**

Figure 3. SAB Activities for Fiscal Year 2002

Table II

SAB Activities for Fiscal Years 1998 - 2002

Fiscal Year	Public Meeting	Public Teleconference	Closed Meeting	Total
1998	42	8(16%)	1	51
1999	33	14(29%)	1	48
2000	32	22(40%)	1	55
2001	24	34(58%)	1	59
2002	18	25(58%)	0	43

Figure 4. Committee Reports for Fiscal Years 1998 - 2002

Table III
Committee Reports and Staffing for Fiscal Years 1998 - 2002

Fiscal Years	Committee Reports			Notifications of Consultations	Staffing	
	Full Reports	Short Reports*	Total		Members	Federal Staff (Full Time Equivalents, FTEs)
1998	11	10	21	9	102	19.7
1999	19	21	40	8	105	19.7
2000	17	20	37	8	104	18.8
2001	8	12	20	8	112	18.8
2002	11	8	19	3	107	17.0

* (include Letter reports, Advisories & Commentaries)

2.0 FY 2002 COMMITTEE ACTIVITIES

The main activity of the SAB are the projects undertaken by its various Committees. In the face of more requests than current resources can address, the Board has had to be selective about its choice of projects. In selecting projects, the SAB has generally been guided by criteria that were originally generated in a self study retreat in 1989 and updated at a Strategic Planning Retreat of the Executive Committee in 1997. Provided below is a list of the SAB criteria.

1. General Criterion

- a. Provides an opportunity to make a difference in Agency Operations.

2. Client-related Criteria

- a. Supports major regulatory or risk management initiatives.
- b. Serves leadership interest such as those of the EPA Administrator or Congress.
- c. Support strategic themes of current interest.

3. Science-driven Criteria

- a. Involves scientific approaches that are new to the Agency.
- b. Deal with areas of substantial uncertainty.

4. Problem-driven Criteria

- a. Involves major environmental risks.
- b. Relates to emerging environmental issues.
- c. Exhibits long-term outlook.

5. Organizational-related Criteria

- a. Serves as a model for future Agency methods.
- b. Requires the commitment of substantial resources to scientific or technological development.
- c. Transcends organizational boundaries, within or outside EPA (includes international boundaries).
- d. Strengthens the Agency's basic capability.

2.1 EXECUTIVE COMMITTEE (EC)

EC Members	
<i>Chair:</i> Dr. William Glaze, Oregon Health & Science University	
Dr. Henry Anderson Wisconsin Division of Public Health	Dr. Raymond Loehr University of Texas
Dr. Trudy Cameron University of Oregon	Dr. M. Granger Morgan Carnegie Mellon University
Dr. Kenneth Cummins Humboldt State University	Dr. William Smith Yale University
Dr. Dom Grasso Smith College	Dr. Robert Stavins Harvard University
Dr. Linda Greer Natural Resources Defense Council	Dr. R. Rhodes Trussell Trussell Technologies
Dr. Philip Hopke Clarkson University	Dr. Terry Young Environmental Defense
Dr. Janet Johnson MFG, Inc.	
Dr. Roger Kasperson Stockholm Environment Institute	
Liaison from Other FACA Committees	
Board of Scientific Counselors Dr. Gerald Schnoor University of Iowa	FIFRA Scientific Advisory Panel Dr. Ronald Kendall Texas Tech University
Children's Health Protection Advisory Committee Dr. Joel Bender American Chemistry Council	

2.1.1 BACKGROUND

The EC coordinates the work of eight SAB standing Committees and numerous ad hoc subcommittees and panels, and works collegially with the Clean Air Scientific Advisory Committee (CASAC) and the Advisory Council on Clean Air Compliance Analysis (Council), both of which are administratively housed within the SAB Staff Office. The EC had

four active subcommittees during the year.

(a) Evaluation of Metals and Metals Compounds

Subcommittee

Chair: Dr. Valerie Thomas
Princeton University

(b) Benefits, Costs and Impacts of RCRA Subtitle C and UST Programs Panel

Chair: Dr. Myrick Freeman
Bowdoin College

(c) Particulate Matter (PM) Centers Review Panel
Chair: Mr. Daniel Greenbaum
Health Effects Institute

(d) Scientific and Technological Achievement
Awards (STAA) Subcommittee
Chair: Dr. H. C. Ward
Rice University

With a Membership consisting of a Chair, the Chairs of the eight standing Committees, the CASAC and the Council, and six At-large Members, this FACA-chartered institution is the nerve center of SAB activity, reviewing reports from the standing Committees (with the exception of reports from the separately chartered CASAC and Council), discussing proposals from standing Committees, and directing the work of ad hoc subcommittees that address complex issues calling for multi-disciplinary expertise.

2.1.2 ACTIVITIES

In FY 2002, the EC met two times in face-to-face FACA meetings. In addition, the EC conducted four publicly accessible conference calls to review formally reports from SAB committees and subcommittees.

The EC's four subcommittees introduced in the previous subsection collectively met face-to-face three times and seven times by publicly accessible conference call.

2.1.3 PRODUCTS

The EC's efforts resulted in the following advice being sent to the Administrator in FY 2002:

(a) Interim Review of the Particulate Matter (PM) Research Centers of the USEPA (EPA-SAB-EC-02-008)

(b) Overview of the Panel Formation Process at the EPA Science Advisory Board (EPA-SAB-EC-02-010)

In addition to these two reports, the EC generated one Commentary and one Advisory in FY 2002:

(a) EPA Science Advisory Board Panel Formation Process: Immediate Steps to Improve Policies and Procedures.:
An SAB Commentary
(EPA-SAB-EC-COM-02-003)

(b) Evaluating the National Scale Air Toxics Assessment (NATA) 1996 Data:
An SAB Advisory
(EPA-SAB-EC-ADV-02-001)

The EC also produced one Workshop report during FY 2002:

(a) EPA SAB/EPA Workshop on the Benefits of Reductions in Exposure to hazardous Air Pollutants: Developing Best Estimates of Dose-Response Functions
(EPA-SAB-EC-WKSHP-02-001)

The EC coordinates the work of 10 standing committees and numerous ad hoc subcommittees and panels. Appendix B3 contains abstracts of these documents; complete documents are available on the SAB Website, <http://www.epa.gov/sab>.

2.2 ADVISORY COUNCIL ON CLEAN AIR COMPLIANCE ANALYSIS (COUNCIL)

COUNCIL Members	
<i>Chair:</i> Dr. Trudy Cameron, University of Oregon	
Ms. Lauraine Chestnut Stratus Consulting Inc.	Dr. Lester B. Lave Carnegie Mellon University
Dr. Don Fullerton University of Texas	Dr. Paul J. Lioy UMDNJ-Robert Wood Johnson Medical School
Dr. Lawrence Goulder Stanford University	Dr. Paulette Middleton Panorama Pathways
Dr. Jane Hall California State University	Dr. V. Kerry Smith North Carolina State University
Dr. James Hammit Harvard University	
Dr. Charles Kolstad University of California	

2.2.1 BACKGROUND

The Council has its origin in the requirements of Section 812 of the Clean Air Act Amendments of 1990. That section mandated that a Council be established to provide independent advice on technical and economic aspects of analyses and reports that the Agency prepares concerning the impacts of the Clean Air Act on public health, the economy, and the environment of the United States; i.e., overall

costs and benefits.

2.2.2 ACTIVITIES

The Council did not hold any activities in FY 2002.

2.3 CLEAN AIR SCIENTIFIC ADVISORY COMMITTEE (CASAC)

CASAC Members	
<i>Chair:</i> Dr. Philip Hopke, Clarkson University	
Dr. Frederick Miller CIIT Centers for Health Research	Dr. George Taylor George Mason University
Mr. Richard L. Poirot Vermont Agency of Natural Resources	Dr. Sverre Vedal National Jewish Medical and Research Center
Dr. Frank Speizer Harvard Medical School	Dr. Barbara Zielinska Desert Research Institute

2.3.1 BACKGROUND

The CASAC is a separately chartered Federal advisory committee that is administratively housed within the offices of the SAB. As an independent advisory committee, the Committee reports directly to the EPA Administrator. The Chair of CASAC serves as a Member of the SAB Executive Committee, and the Members of CASAC are also Members of the SAB.

The CASAC has a statutorily mandated responsibility (under the 1977 and 1990 Clean Air Act Amendments) to review and offer scientific and technical advice to the Administrator on the air quality criteria and regulatory documents which form the basis for the national ambient air quality standards (NAAQS). NAAQS have been established for lead, particulate matter (PM), ozone and other photochemical oxidants (O₃), carbon monoxide (CO), nitrogen oxides (NO_x), and sulfur oxides (SO_x). The CASAC process includes a peer review of the Office of Research and Development's Air Quality Criteria Document (CD) for a given NAAQS, followed by peer review of the Office of Air and Radiation's

Staff Paper (SP) for that NAAQS. The CD contains all the relevant scientific and technical information on the pollutant, while the SP is the bridge between the science in the CD and the policy decision that has to be made by the EPA Administrator. When asked by EPA, the Committee also reviews the scientific and technical issues in the regulatory proposal for a NAAQS prior to its promulgation. The Committee also offers research recommendations for individual NAAQS pollutants on a periodic basis, often in conjunction with a review of the Agency's Strategic Research Plan for that pollutant.

2.3.2 ACTIVITIES

The CASAC met three times during FY 2002 – one face-to-face meeting, two publicly accessible conference calls. In addition, the CASAC Subcommittee on Particle Monitoring held one face-to-face meeting and one teleconference meeting.

2.3.3 PRODUCTS

The CASAC issued the following reports during FY 2002

- (a) Review of the Agency's Continuous Monitoring Implementation Plan
(EPA-SAB-CASAC-LTR-02-001)
- (b) Review of the EPA Air Quality Criteria Document for Particulate Matter: Third External Review Draft
(EPA-SAB-CASAC-LTR-02-003)
- (c) Review of the Agency's draft Proposed Methodology for Particulate Matter Risk Analysis for Selected Urban Areas: An Advisory by the CASAC

(EPA-SAB-CASAC-ADV-02-002)

- (d) Consultation on the Agency's Proposed Methodology for Measuring Coarse Particulate Matter
(EPA-SAB-CASAC-CON-02-001)

Appendix B3 contains abstracts of these documents; complete documents are available on the SAB Website, <http://www.epa.gov/sab>.

2.4 DRINKING WATER COMMITTEE (DWC)

DWC Members

Chair: Dr. R. Rhodes Trussell, Trussell Technologies, Inc

Dr. David Baker
Heidelberg College

Dr. Mary Davis
West Virginia University

Dr. Ricardo DeLeon
Metropolitan Water District of Southern California

Dr. John Evans
Harvard University

Dr. Sidney Green
Howard University

Dr. Barbara Harper
Yakama Indian Nation

Dr. Irva Hertz-Picciotto
University of North Carolina-Davis

Dr. Lee D. McMullen
Des Moines Water Works

Dr. Christine Moe
Emory University

Dr. Philip Singer
University of North Carolina

Dr. Gary Toranzos
University of Puerto Rico

2.4.1 BACKGROUND

The DWC provides independent advice and peer reviews to EPA's Administrator on the technical aspects of problems and issues associated with the drinking water program, including the research that supports the program. Consequently, the primary clients for the Committee are EPA's Office of Water (OW) and the Office of Research and Development (ORD).

The importance of SAB interactions with the Agency was reinforced in the Safe Drinking Water Act Amendments which requires Agency consultation with the SAB on many Drinking Water actions.

2.4.2 ACTIVITIES

The DWC conducted two face-to-face meetings during the year. Topics

discussed during the meetings included:

- (a) Proposed Long-Term 2 Enhanced Surface Water Treatment Rule (LT2ESWTR), and,
- (b) Stage 2 Disinfection/Disinfection By-Product Rule (S2DBPR).

For these reviews, the DWC focus was certain parts of the scientific analyses being used to prepare the proposal. In addition, the DWC met via telephone conference to be briefed by the OW on two projects that it wanted SAB feedback upon. One was the protocol used in making six-year review determinations for existing National Primary Drinking Water Regulations. The other was the protocol used in making determinations of whether or not to regulate contaminants on the Contaminant Candidate List Number 1. The Committee agreed to begin a review of the protocols in early FY 2003. During FY 2003, the SAB delivered its report on the EPA Contaminant Candidate List Research Plan to the Agency.

2.4.3 PRODUCTS

These efforts resulted in the following advice being sent to the EPA Administrator during the year:

- (a) EPA Contaminant Candidate List Research
Plan: An SAB Report
(EPA-SAB-DWC-02-006)

Appendix B3 contains abstracts of this document; a complete document is available on the SAB Website, <http://www.epa.gov/sab>.

2.5 ECOLOGICAL PROCESSES AND EFFECTS COMMITTEE (EPEC)

EPEC Members

Chair: Terry Young, Environmental Defense

Dr. Steven Bartell

Cadmus Group

Dr. Gregory Biddinger

Exxon Mobil Refining & Supply Company

Dr. Virginia Dale

Oak Ridge National Laboratory

Dr. Ivan Fernandez

University of Maine

Dr. Cynthia Gilmour

Academy of Natural Sciences

Dr. Charles Hawkins

Utah State University

Dr. Lawrence L. Master

NatureServe

Dr. Judith L. Meyer

University of Georgia

Dr. William Mitsch

The Ohio State University

Dr. Michael C. Newman

College of William & Mary

Dr. Charles Pittinger

The Cadmus Group Inc.

2.5.1 BACKGROUND

The EPEC is the primary committee responsible for reviews and advice relating to ecological issues, including environmental monitoring and assessment, ecological risk assessment, and ecological criteria. Traditionally, the Committee has sought to elevate the Agency's attention to non-chemical stressors (e.g., habitat issues, physical alterations of ecosystems, and introduced species) and to raise the visibility of ecological risks in an Agency often preoccupied with human health concerns.

2.5.2 ACTIVITIES

The EPEC held a workshop on the development of its report on a Framework for Ecological Condition in FY 2002. No other meetings were held.

2.5.3 PRODUCTS

The Committee's final report on the Framework for Ecological Condition was released in late 2002, and discussed six

ecological attributes and included case examples to illustrate potential applications of the reporting framework for EPA programs and projects. The report, *A Framework for Assessing and Reporting on Ecological Condition*, is available in a bound report with a separate bound Executive Summary (EPA-SAB-EPEC-02-009 and EPA-SAB-EPEC-02-009a)

Other EPEC reports completed during FY2002 include:

(a) Review of the Science to Achieve Results (STAR) Water and Watersheds Extramural Grants Program (EPA-SAB-EPEC-02-001)

(b) Planning for Ecological Risk Assessment:

Developing Management Objectives (EPA-SAB-EPEC-02-005)

(c) Review of the Southeastern Ecological Framework (EPA-SAB-EPEC-LTR-02-002)

Appendix B3 contains abstracts of this document; a complete document is available on the SAB Website, <http://www.epa.gov/sab>.

2.6 ENVIRONMENTAL ECONOMICS ADVISORY COMMITTEE (EEAC)

EEAC Members

Chair: Dr. Robert Stavins, Harvard University

<p>Dr. Dallas Burtraw Resources for the Future</p> <p>Dr. Lawrence Goulder Stanford University</p> <p>Dr. Michael Hanemann University of California</p> <p>Dr. Gloria Heffland University of Michigan</p> <p>Dr. Paul Joskow Massachusetts Institute of Technology</p> <p>Dr. Catherine Kling Iowa State University</p>	<p>Dr. Richard Norgaard University of California-Berkeley</p> <p>Dr. Stephen Polasky University of Minnesota</p> <p>Dr. Richard Revesz New York University</p> <p>Dr. Jason Shogren University of Wyoming</p> <p>Dr. Hilary Sigman Rutgers University</p>
---	---

2.6.1 BACKGROUND

The EEAC provides advice to the Administrator on cross-cutting

guidance for EPA's office that conduct analyses of economics, cost, and benefits of environmental regulations. The Committee also advises the Agency on its economic research efforts. On

occasion, the Committee provides independent advice and peer reviews to EPA's Administrator on the technical aspects of specific economic analyses that are used in the development of regulations or other Agency initiatives. All parts of the Agency are potentially clients for the Committee.

2.6.2 ACTIVITIES

The EEAC met three times (two face-to-face meetings and one telephone conference meeting) in FY2002. Topics discussed during the face-to-face meetings included:

- (a) A briefing on EPA's continuing efforts to enhance its practices for estimating the benefits of environmental actions that reduce mortality risks
- b) A Consultation on possible opportunities for using incentives in water quality pollution control
- c) A Consultation on EPA's approach to developing an economic research strategy
- d) A briefing on the Pollution Abatement Cost and Expenditures (PACE) Survey, and
- e) A review of the national affordability criteria for small systems.

During the telephone conference meeting, the EEAC reached closure on its advice that is to be delivered in a report to the Administrator on the EPA small system affordability criteria.

2.6.3 PRODUCTS

The Committee issued one Commentary and two Notifications of Consultation during FY 2002.

- a) Importance of Maintaining the Annual Pollution Abatement Cost and Expenditures (PACE) Survey (EPA-SAB-EEAC-COM-02-001)
- b) Market Incentives: A SAB Notification of Consultation (EPA-SAB-EEAC-CON-02-002)
- c) An Approach to Developing a Research Agenda for Environmental Economics: A SAB Notification of Consultation (EPA-SAB-EEAC-CON-02-003)

Appendix B3 contains abstracts of this document; a complete document is available on the SAB Website, <http://www.epa.gov/sab>.

2.7 ENVIRONMENTAL ENGINEERING COMMITTEE (EEC)

EEC Members

Chair: Dr. Domenico Grasso, Smith College

Past Chair: Hilary Inyang, University of North Carolina-Charlotte

Dr. H. Barry Dellinger
Louisiana State University

Dr. Michael Kavanaugh
Malcolm Pirnie Inc.

Dr. Byung Kim
Ford Motor Company

Dr. John P. Maney
Environmental Measurements Assessment

Dr. Michael McFarland
Utah State University

Dr. Bruce E. Rittmann
Northwestern University

Dr. Thomas Theis
University of Illinois-Chicago

Dr. Valerie Thomas
Princeton University

2.7.1. BACKGROUND

The EEC is one of the original five SAB committees. The interests/responsibilities of this interdisciplinary Committee, anchored by the presence and leadership of environmental engineers, have grown to include such cross-Agency issues as industrial ecology, technology diffusion, and implementation of the Quality System.

2.7.2 ACTIVITIES

The EEC and its Subcommittees conducted one face-to-face meeting and four publicly accessible conference calls in FY 2002.

2.7.3 PRODUCTS

The EEC's work resulted in the following advice being submitted to the Administrator:

- a) Industrial Ecology: A Commentary by the EPA Science Advisory Board (EPA-SAB-EEC-COM-02-002)

Appendix B3 contains abstracts of these documents; complete documents are available on the SAB Website, <http://www.epa.gov/sab>.

2.8 ENVIRONMENTAL HEALTH COMMITTEE (EHC)

EHC Members

Chair: Dr. Henry A. Anderson, Wisconsin Division of Public Health

Dr. Michael DeBaun
Washington University School of Medicine
Dr. Paul Foster
Chemical Industry Institute of Toxicology
Dr. Dale Hattis
Clark University
Dr. David Hoel
University of South Carolina
Dr. George Lambert
UMDNJ-Robert Wood Johnson University

Dr. Grace Lemasters
University of Cincinnati
Dr. Abby Li
Monsanto Company
Dr. Ulrike Luderer
University of California-Irvine
Dr. Roy Shore
New York University

2.8.1 BACKGROUND

The EHC, one of the original five SAB Committees, now shares responsibilities for the review of health effects-related issues with several Committees of the Board (DWC, IHEC, RAC, and CASAC). Over the past several years, the principal focus for the EHC has been on issues related to development and use of guidelines for health risk assessments, rather than the review of agent-specific assessments which had previously been a major activity. In contrast this year, the EHC reviewed EPA's Trichloroethylene (TCE) Health Risk Assessment.

2.8.2 ACTIVITIES

The EHC formed a new Panel, Trichloroethylene (TCE) Health Risk Assessment Review Panel, composed of EHC Members plus Consultants and conducted 1 face-to-face and 2 teleconference meetings on the review of the Office of Research and Development's draft TCE Health Risk Assessment during late FY 2002.

2.8.3 PRODUCTS

The report for the above referenced meetings is in preparation.

The EHC produced the following report as part of a joint effort with the SAB Integrated Human Exposure Committee (IHEC):

- (a) Review of the Office of Air and Radiation and Indoor Air's draft Methodology for Ranking Indoor Air Toxics (EPA-SAB-EHC/IHEC-02-004)

Appendix B3 contains abstracts of this document; a complete document is available on the SAB Website, <http://www.epa.gov/sab>.

2.9 INTEGRATED HUMAN EXPOSURE COMMITTEE (IHEC)

IHEC Members

Chair: Dr. Ken Sexton, University of Minnesota

Past Chair: Dr. Henry Anderson, Wisconsin Division of Public Health

Dr. Timothy Buckley
Johns Hopkins University

Dr. Annette Guiseppi-Elie
DuPont Spruance Plant

Dr. Robert Harley
University of California

Dr. Lovell Jones
University of Texas

Dr. Catherine Koshland
University of California

Dr. George W. Lucier
Consultant

Dr. Randy Maddalena
Lawrence Berkeley National Laboratory

Dr. Rebecca Parkin
The George Washington University

Dr. Jed M. Waldman
California Department of Health Services

Dr. David Wallinga
Institute for Agriculture and Trade Policy

Dr. Charles Weschler
UMDNJ-Robert Wood Johnson Medical School

2.9.1 BACKGROUND

In 1996, the Executive Committee established the Integrated Human Exposure Committee (IHEC) in growing recognition of the need for the Agency -- and the Board -- to consider risk factors, including exposure, in a more holistic fashion. The IHEC was essentially a re-naming of the Indoor Air Quality Committee (IAQC) that was formed in response to a Congressional determination (Superfund Act of 1986) that the actual exposure, including indoor air, of the human population to various environmental agents is a key factor in determining the nature and extent of possible health risks.

2.9.2 ACTIVITIES

In FY 2002, IHEC held no meetings.

2.9.3 PRODUCTS

The Committee, in conjunction with the Environmental Health Committee (EHC) produced a report titled:

- (a) Review of the Office of Radiation and Indoor Air's Draft Methodology for Ranking Indoor Air Toxics
(EPA-SAB-EHC/IHEC-02-004)

This report reviewed a draft methodology for generating an order-of-magnitude, screening-level ranking of key indoor air toxics. The methodology was developed by EPA's Office of Radiation and Indoor Air (OIRA) as an outgrowth of the methodology used to select key pollutants for the National Air Toxics Program/Urban Air Toxics Strategy.

Appendix B3 contains abstracts of this document; a complete document is available on the SAB Website, <http://www.epa.gov/sab>.

2.10 RADIATION ADVISORY COMMITTEE

RAC Members

Chair: Dr. Janet Johnson, Shepherd Miller, Inc.

Dr. Lynn Anspaugh

University of Utah

Dr. Bruce Boecker

Lovelace Respiratory Research Institute

Dr. Gilles Bussod

Science Network International, Inc.

Dr. Thomas F. Gesell

Idaho State University

Dr. Helen Grogan

Consultant, Cascade Scientific, Inc.

Dr. Richard Hornung

University of Cincinnati

Dr. Jill Lipoti

New Jersey Department of Environmental Protection

Dr. Genevieve Roessler

Consultant

2.10.1 BACKGROUND

Throughout its history, the RAC has had the Office of Radiation and Indoor Air (ORIA) as its principal customer. However, other offices within and outside of the Agency have sought advice from the RAC. In particular, there has been an increasing interest and attention to inter-agency aspects of radiation protection. As a consequence, the RAC has been sought out by the Federal agencies, departments and commissions and has been actively involved in a number of joint reviews on inter-agency technical and scientific topics. These include such topics, such as radiation protection, decommissionings and cleanups on products jointly prepared by the US EPA, the US Nuclear Regulatory Commission (NRC), the US Department of Energy (DOE), and the US Department of Defense (DOD).

2.10.2 ACTIVITIES

In FY 2002, the RAC and its Multi-Agency Radiological Laboratory Analytical Protocols (MARLAP) Review Panel met a total of five times in public meetings to conduct its activities. There were two face-to-face MARLAP Meetings, as well as two public conference calls. Additionally, one RAC Planning meeting for FY 2003 projects that took place on September 26, 2002. In specific reference to the MARLAP Review, the RAC expanded its inter-agency involvement, having also included involvement by the US Food and Drug Administration (FDA), the National Institute of Standards and Technology (NIST) and the US Geological Survey (USGS), as well as two participating states (California and Kentucky) in addition to involvement by the US EPA, DOD, DOE, and the NRC in the MARLAP activity. It is interesting to note that it took the Federal MARLAP Work Group from these seven participating agencies, departments and commissions and two participating states 7 years to prepare the review draft of the Protocols Manual.

2.10.3 PRODUCTS

During Fiscal Year 2002, the SAB/RAC's MARLAP Review Panel worked on drafting its review report as their main activity. Due to the extensive commentary required by the MARLAP Review Panel, the actual report was not finalized this fiscal year.

2.11 RESEARCH STRATEGIES ADVISORY COMMITTEE (RSAC)

RSAC Members

Dr. Raymond Loefer, University of Texas

Dr. William J. Adams
Kennecott Utah Copper Corp.

Dr. Steven Bartell
Cadmus Group

Dr. Richard Bull
MoBull Consulting

Dr. Robin Cantor
LECG, LLC

Dr. Philip Hopke
Clarkson University

Dr. Hilary Inyang
University of North Carolina

Dr. Alan Maki
EXXON Mobil

Dr. Genevieve Matanoski
Johns Hopkins University

Dr. Maria Morandi
University of Texas

Dr. Mark Utell
University of Rochester Medical Center

Dr. James E. Watson
University of North Carolina

Dr. Lauren Zeise
California Environmental Protection Agency

2.11.1 BACKGROUND

The RSAC advises the Agency and Congress on the overall EPA Science and Technology (S&T) Budget, as well as the Agency's overarching science programs and policies (e.g., STAR program, peer review policy, etc.). Each spring RSAC conducts its review of the President's budget request for the following fiscal year and testifies before the House

Committee on Science and Technology's Subcommittee on Energy and the Environment. RSAC also provides advice to EPA as requested.

An important RSAC role is to be a presence to encourage consideration of long-term science at EPA. Being both a regulatory and a science Agency, RSAC helps the Agency find ways to use science for its immediate and intermediate needs and also helps it maintain a long-term

science program by providing advice and reminders about the need to stay the course on key areas of science.

Generally, RSAC members serve or have served on other SAB Committees and tend to be more senior than the members of other SAB committees. This experience insures that the Committee is familiar with EPA operations, its science needs, and how Big science is budgeted and conducted.

2.11.2 ACTIVITIES

The RSAC conducted two face-to-face meetings during the year. There were no Consultants involved in these efforts.

Among the issues addressed at these meetings were the following:

- (a) Multi-Year Plan for Water Quality
- (b) Multi-Year Plan for Pollution Prevention
- (c) The President's FY 2003 Science and Technology Budget for EPA

In April, Dr. Genevieve Matanoski,

RSAC Member, testified before the Subcommittee on Environment, Technology, and Standards of the House Committee on Science on the RSAC's review of the President's Budget Request for Science and Technology at USEPA.

2.11.3 PRODUCTS

The RSAC efforts resulted in two full reports being submitted to the EPA Administrator in FY 2002:

- (a) FY 2003 Presidential Science and Technology Budget Request for the Environmental Protection Agency: An SAB Review (EPA-SAB-RSAC-02-007)
- (b) Water Quality and Pollution Prevention Multiyear Plans: An SAB Review (EPA-SAB-RSAC-02-003)

Appendix B3 contains abstracts of these documents; complete documents are available on the SAB website, <http://www.epa.gov/sab>.

APPENDIX A

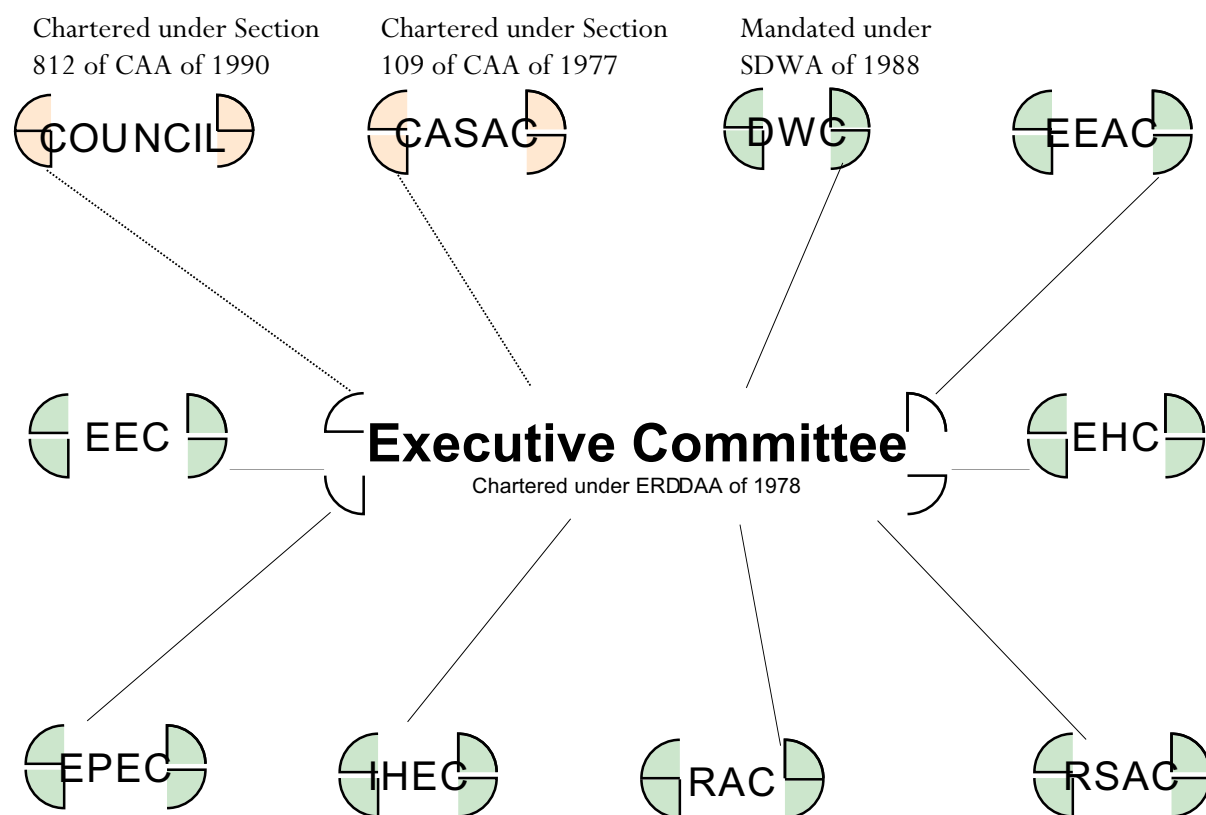
SAB S STRUCTURE & AUTHORITIES

- A1. Organizational Chart
- A2. Introduction to Charters
 - A2.1 EPA Science Advisory Board Charter
 - A2.2 Clean Air Scientific Advisory Committee Charter
 - A2.3 Advisory Council on Clean Air Compliance Analysis Charter

A1

ORGANIZATIONAL CHART

U.S. ENVIRONMENTAL PROTECTION AGENCY SCIENCE ADVISORY BOARD



All Committees (except COUNCIL and CASAC which report directly) report to the Administrator through the Executive Committee

COUNCIL	Advisory Council on Clean Air Compliance Analysis
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
IHEC	Integrated Human Exposure Committee
RAC	Radiation Advisory Committee
RSAC	Research Strategies Advisory Committee

A2

CHARTERS

The Science Advisory Board was formally chartered in 1978 by the Environmental Research, Development, and Demonstration Authorization Act (ERDDAA). The Board is a Federal Advisory Committee and must comply with the Federal Advisory Committee Act (FACA). The SAB is a Congressionally mandated and a FACA-chartered advisory committee, currently consisting of 10 Committees (Appendix B), coordinated by an Executive Committee.

The Charter requires formation of an Executive Committee and inclusion of the Clean Air Scientific Advisory Committee (CASAC) and the Advisory Council on Clean Air Compliance Analysis (COUNCIL) (Appendix A). Otherwise, the Board may organize itself as needed to meet its responsibilities. It must comply with FACA (5 U.S.C.) and related regulations. The charters must be renewed every two years, announce its meetings in the Federal Register, and provide opportunities for public comment on issues before the Board. CASAC and COUNCIL are independently chartered FACA committees. As such, they report directly to the Administrator. However, they are administratively housed within the SAB and their Chairs participate as fully integrated members of the SAB Executive Committee.

An advisory committee charter is intended to provide a description of a committee's mission, goals, and objectives. It also provides a basis for evaluating a committee's progress and its effectiveness. The advisory committee charter must contain the following information:

- (1) The committee's official designation;
- (2) The objectives and the scope of the committee's activity
- (3) The period of time necessary to carry out the committee's purpose(s)
- (4) The agency or official to whom the committee reports
- (5) The agency responsible for providing the necessary support to the committee
- (6) A description of the duties for which the committee is responsible and specification of the authority for any non-advisory functions
- (7) The established annual operation costs to operate the committee in dollars and person years
- (8) The estimated number and frequency of committee meetings
- (9) The planned termination date, if less than 2 years from the date of establishment of the committee
- (10) The name of the individual and/or organization responsible for fulfilling the provisions of section 6(b) of FACA, which requires a report to the Congress one year after a Presidential advisory committee provides public recommendations to the President; and
- (11) The date the committee charter is filed.

A2.1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY CHARTER

EPA SCIENCE ADVISORY BOARD

1. **Committee's Official Designation (Title):**

EPA Science Advisory Board

2. **Authority:**

This charter renews the EPA Science Advisory Board (SAB) in accordance with the provisions of the Federal Advisory Committee Act (FACA), 5 U.S.C. App § 9 (c). SAB is in the public interest and supports EPA in performing its duties and responsibilities. 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; November 8, 1989, November 8, 1991, November 8, 1993, November 8, 1995, November 7, 1997, November 8, 1999.

3. **Objectives and Scope of Activities:**

The objective of the Board is to provide independent advice and peer review 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 U. S. Senate Committees and Subcommittees and U.S. House Committees and Subcommittees, as appropriate. 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, the Clean Air Act Amendments of 1977, and the Clean Air Act Amendments of 1990.

The major objectives are to review and provide EPA advice and recommendations on:

- (1) 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 Clean Water Act, the Resource Conservation and Recovery 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

- (2) The scientific and technical adequacy of Agency programs, guidelines, documents, methodologies, protocols, and tests
- (3) New or revised scientific criteria or standards for protection of human health and the environment
- d. Matters as required under the Clean Air Act, as amended in 1977 and 1990, through the Clean Air Scientific Advisory Committee and the Advisory Council on Clean Air Compliance Analysis
- e. New information needs and the quality of Agency plans and programs for research, development and demonstration
- f. The relative importance of various natural and anthropogenic pollution sources

As appropriate, the SAB consults and coordinates with:

- a. The Scientific Advisory Panel established by the Administrator pursuant to section 21 (b) of the Federal Insecticide, Fungicide and Rodenticide Act, as amended; and other Agency FACA Committees; and
- b. Other Federal advisory groups, as appropriate, to conduct the business of the Board

4. Description of Committees Duties:

The duties of the SAB are solely advisory in nature.

5. Official(s) to Whom the Committee Reports:

The Committee will report with its advice and recommendations to the Administrator of the Environmental Protection Agency.

6. Agency Responsible for Providing the Necessary Support:

EPA will be responsible for financial and administrative support. Within EPA, this support will be provided by the Office of the Administrator.

7. Estimated Annual Operating Costs and Work Years:

The estimated annual operating cost of the SAB is \$2,109,028 which includes 22.7 work-years of support.

8. Estimated Number and Frequency of Meetings:

There will be approximately fifty (50) meetings of SAB s standing committees and specialized subcommittees each year. Meetings may occur approximately four (4) to five (5) times a month, or as

needed and approved by the Designated Federal Officer (DFO). EPA may pay travel and per diem expenses when determined necessary and appropriate. A full-time or permanent part-time employee of EPA will be appointed as the (DFO). The DFO or a designee will be present at all meetings and each meeting will be conducted in accordance with an agenda approved in advance by the DFO. The DFO is authorized to adjourn any meeting when he or she determines it in the public interest to do so. Among other things, FACA requires open meetings and an opportunity for interested persons to file comments before or after such meetings, or to make statements to the extent that time permits.

9. Duration and Termination:

The SAB will be needed on a continuing basis. This charter will be effective until November 8, 2003, at which time it may be renewed for another two-year period.

10. Member Composition:

The SAB's Executive Committee will be composed of approximately seventeen (17) members, who are the chairs of SAB's standing committees, chairs from the separately chartered Advisory Council on Clean Air Compliance Analysis, the Clean Air Act Scientific Advisory Committee, and at-large members. Most members will serve as Special Government Employees. Members will be selected from among, but are not limited to; independent scientists, engineers, and economists to provide a range of expertise required to assess the scientific and technical aspects of environmental issues.

11. Subgroups:

EPA may form SAB subcommittees or workgroups for any purpose consistent with this charter. Such subcommittees or workgroups may not work independently of the chartered committee. Subcommittees or workgroups have no authority to make decisions on behalf of the chartered committee nor can they report directly to the Agency.

October 22, 2001
Agency Approval Date

November 8, 2001
Date Filed with Congress

A2.2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY CHARTER

CLEAN AIR SCIENTIFIC ADVISORY COMMITTEE

1. **Committee's Official Designation (Title):** _____

Clean Air Scientific Advisory Committee

2. **Authority:**

This charter renews the Clean Air Scientific Advisory Committee (CASAC) in accordance with the provisions of the Federal Advisory Committee Act (FACA), 5 U.S.C. App.

§ 9 (c). CASAC is in the public interest and supports EPA in performing its duties and responsibilities. CASAC was specifically directed by law on August 7, 1977 under § 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; August 7, 1991; September 30, 1993, August 7, 1995, August 7, 1997, and August 7, 1999.

3. **Objectives and Scope of Activities:**

CASAC will provide advice, information and recommendations on the scientific and technical aspects of issues related to the criteria for air quality standards, research related to air quality, sources of air pollution, and the strategies to attain and maintain air quality standards and to prevent significant deterioration of air quality.

The major objectives are to:

- (a) Not later than January 1, 1980, and at five year intervals thereafter, complete a review of the criteria published under § 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
- (b) 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
- (c) Describe the research efforts necessary to provide the required information
- (d) Advise the Administrator on the relative contribution to air pollution concentrations of natural as well as anthropogenic activity

- (e) 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

4. **Description of Committees Duties:**

The duties of CASAC are solely advisory in nature.

5. **Official(s) to Whom the Committee Reports:**

The Committee will submit advice and recommendations and report to the Administrator of the Environmental Protection Agency.

6. **Agency Responsible for Providing the Necessary Support:**

EPA will be responsible for financial and administrative support. Within EPA, this support will be provided by the EPA Science Advisory Board, Office of the Administrator.

7. **Estimated Annual Operating Costs and Work Years:**

The estimated annual operating cost of the CASAC is \$396,372 which includes 1.9 work-years of support.

8. **Estimated Number and Frequency of Meetings:**

The committee expects to meet approximately three (3) to six (6) times a year. Meetings may occur approximately once every two (2) to four (4) months or as needed and approved by the Designated Federal Officer (DFO). EPA may pay travel and per diem expenses when determined necessary and appropriate. A full-time or permanent part-time employee of EPA will be appointed as the (DFO). The DFO or a designee will be present at all meetings and each meeting will be conducted in accordance with an agenda approved in advance by the DFO. The DFO is authorized to adjourn any meeting when he or she determines it in the public interest to do so. Among other things, FACA requires open meetings and an opportunity for interested persons to file comments before or after such meetings, or to make statements to the extent that time permits.

9. **Duration and Termination:**

_____ CASAC will be needed on a continuing basis. This charter will be effective until August 7, 2003, at which time it may be renewed for another two-year period.

10. **Member Composition:**

CASAC will be composed of seven (7) members. 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. 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. Most members will serve as Special Government Employees (SGE).

11. Subgroups:

EPA may form CASAC subcommittees or workgroups for any purpose consistent with this charter. Such subcommittees or workgroups may not work independently of the chartered committee. Subcommittees or workgroups have no authority to make decisions on behalf of the chartered committee nor can they report directly to the Agency.

July 11, 2003
Agency Approval Date

August 6, 2003
Date Filed with Congress

A2.3

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY CHARTER

ADVISORY COUNCIL ON CLEAN AIR COMPLIANCE ANALYSIS

1. **Committee's Official Designation (Title):**

Advisory Council on Clean Air Compliance Analysis

2. **Authority:**

This charter renews the Advisory Council on Clean Air Compliance Analysis (Council) in accordance with the provisions of the Federal Advisory Committee Act (FACA), 5 U.S.C. App. § 9 (c). The Council is in the public interest and supports the Environmental Protection Agency (EPA) in performing its duties and responsibilities. The Council was specifically directed under § 812 of the Clean Air Act, as amended on November 15, 1990 (42 U.S.C. 7401 *et seq.*).

3. **Objectives and Scope of Activities:**

The Council will provide advice, information and recommendations on technical and economic aspects of analyses and reports which EPA prepares concerning the impacts of the Clean Air Act (CAA) on the public health, economy, and environment of the United States.

The major objectives required of the Council by the Clean Air Act Amendments of November 15, 1990 are:

- (a) Review data to be used for any analysis required under section 812 and make recommendations on its use.
- (b) Review the methodology used to analyze such data and make recommendations on the use of such methodology.
- (c) Prior to the issuance of a report to Congress required under Section 812, review the findings of the report and make recommendations concerning the validity and utility of such findings.

At EPA's request, the Council will:

- (a) Review other reports and studies prepared by EPA relating to the benefits and costs of the CAA.

- (b) Provide advice on areas where additional knowledge is necessary to fully evaluate the impacts of the CAA and the research efforts necessary to provide such information.

4. Description of Committees Duties:

The duties of the Council are solely advisory in nature.

5. Official(s) to Whom the Committee Reports:

The Committee will report to, and provide advice and recommendations to, the Administrator of the Environmental Protection Agency.

6. Agency Responsible for Providing the Necessary Support:

EPA will be responsible for financial and administrative support. Within EPA, this support will be provided by the Science Advisory Board (SAB).

7. Estimated Annual Operating Costs and Work Years:

The estimated annual operating cost of the Council is \$199,000 which includes 1.7 work-years of support.

8. Estimated Number and Frequency of Meetings:

The Council expects to meet approximately two (2) to four (4) times a year. Meetings will likely occur approximately once every three (3) to six (6) months, or as needed and approved by the Designated Federal Officer (DFO). EPA may pay travel and per diem expenses as determined necessary and appropriate by the DFO. A full-time or permanent part-time EPA employee will be appointed as DFO. The DFO or a designee will be present at all meetings, and each meeting will be conducted in accordance with an agenda approved in advance by the DFO. The DFO is authorized to adjourn any meeting when he or she determines it in the public interest to do so. Among other things, FACA requires open meetings and an opportunity for interested persons to file comments before or after such meetings, or to make statements to the extent that time permits.

9. Duration and Termination:

_____The Council will be needed on a continuing basis, and may be renewed upon the expiration of each successive two year period following the date of enactment of the CAA (as amended on November 15, 1990), as authorized in accordance with § 14 of FACA.

10. Member Composition:

The Council will be composed of at least 9 members. Most members will serve as Special Government Employees (SGE), subject to conflict-of-interest restrictions. Members will be selected from

among, but are not limited to, recognized experts from the fields of health and environmental effects of air pollution, economics analysis, environmental sciences.

11. Subgroups:

EPA may form Council subcommittees or workgroups for any purpose consistent with this charter. Such subcommittees or workgroups may not work independently of the chartered committee. Subcommittees or workgroups have no authority to make decisions on behalf of the chartered committee nor can they report directly to the Agency.

November 26, 2002
Agency Approval Date

January 10, 2003
Date Filed with Congress

APPENDIX B

SAB ACTIVITIES & PRODUCTS

- B1. SAB FACA Meetings for FY 2002
- B2. SAB FY 2002 Products
- B3. Abstracts of SAB Reports, Advisories and Commentaries
- B4. Accessing SAB Reports and Notification of SAB Meetings
- B5. Abstracts of the SAB Lecture Series - Science & the Human Side of Environmental Protection

B1

SAB MEETINGS FOR FY 2002

Glossary of Acronyms for the EPA Science Advisory Board

CASAC	Clean Air Scientific Advisory Committee
COUNCIL	Advisory Council on Clean Air Compliance Analysis
AQMS	Air Quality Modeling Subcommittee
HEES	Health and Ecological Effects Subcommittee
DWC	Drinking Water Committee
EC	Executive Committee
EEAC	Environmental Economics Advisory Committee
EEC	Environmental Engineering Committee
EHC	Environmental Health Committee
EPEC	Ecological Processes and Effects Committee
IHEC	Integrated Human Exposure Committee
IRP	Integrated Risk Project
RAC	Radiation Advisory Committee
RROS	Risk Reduction Options Subcommittee
RSAC	Research Strategies Advisory Committee

*Note: indicates teleconferences; all other meetings are face to face.
All meeting were held in Washington, DC unless otherwise noted.*

<u>First Quarter</u>	<u>Committee</u>	<u>Topic(s)</u>
October 1	CASAC	Methodology for Measuring Coarse Particles
October 16-17	RSAC	Multi-Year Plans for Pollution Prevention and Water Quality
October 24-26	EEC	Surface Impoundments
November 7	EEC	Review and Approval
November 14	EC	Review Meeting
November 28-29	EC	Review Meeting
November 30	EEAC	Premature Mortality Valuation

December 10-12	DWC	Stage II Disinfection/Disinfectant By-Product Rule Proposal; and Long-Term Enhanced Surface Water Treatment Rule Proposal
<u>Second Quarter</u>	<u>Committee</u>	<u>Topic(s)</u>
January 11	EC	Review Meeting
January 28	CASAC	Continuous Monitoring Implementation Plan
January 30	EEC	EEC Review of Subcommittee Reports on: 1) Surface Impoundments Study; and 2) RROS
February 1	EEC	Surface Impoundments Study Review
February 8	EPEC	Framework for Reporting on Ecological Conditions
February 11-12	EC Subc.	PM Centers Review
February 20-21	RSAC	FY2003 S&T Budget Review
February 27	CASAC	Particulate Matter Risk Assessment Methodology; and CASAC Review of Subcommittee Report on Continuous Monitoring Implementation Plan
March 6-7	EC	Review Meeting
March 13	EEC	Review of Surface Impoundments Draft Report
March 27	EC Subc	PM Centers Review
<u>Third Quarter</u>	<u>Committee</u>	<u>Topic(s)</u>
April 8	RAC	Multi-Agency Radiological Laboratory Analytic Protocols
April 23-25	RAC	Multi-Agency Radiological Laboratory Analytic Protocols
May 8	EC	Review Meeting
May 9	EC	Benefits, Costs and Impacts of RCRA Subtitle C & UST Programs
May 20-21	EC	Benefits, Cost and Impacts of RCRA Subtitle C & UST Programs
June 5	EHC	Trichloroethylene Health Risk Assessment

June 11	DWC	Candidate Contaminants List Follow-up; 6-year Review Process; and Planning
June 13	EEAC	Affordability; and OW Trading Policy
June 18	EC	Benefits, Costs and Impacts of RCRA Subtitle C & UST Programs
June 18-19	EHC	Trichloroethylene (TCE) Health Risk Assessment
June 27	RAC	Multi-Agency Radiological Laboratory Analytic Protocols
<u>Fourth Quarter</u>	<u>Committee</u>	<u>Topic(s)</u>
July 8	EC	Policy and Procedures Subcommittee Discussion
July 10-12	EC	STAA Review
July 16	EC	Review Meeting
July 18	EC Subc.	Benefits, Costs and Impacts of RCRA Subtitle C & UST Programs
July 18-19	EHC	Trichloroethylene Health Risk Assessment
August 8	EC Subc.	PBT/Evaluation of Metals & Metal
Compounds		
August 12	EEAC	Affordability
August 15	EC Subc.	Evaluation of Metals & Metal Compounds
August 28	CASAC Subc.	Particulate Matter Criteria Document Review-III
August 29	EC Subc.	Evaluation of Metals & Metal Compounds
September 10-12	EC Subc.	Evaluation of Metals & Metal Compounds
September 24-26	RAC Subc.	MARSSIM & MARLAP II
September 26	RAC	Review Meeting

B2

SAB FY 2002 PRODUCTS

FULL REPORTS	
EPA-SAB-EPEC-02-001	Review of the Science to Achieve Results (STAR) Water and Watersheds Extramural Grants Program
EPA-SAB-EC-02-002	SAB FY 2001 Annual Report
EPA-SAB-RSAC-02-003	Review of the U.S. EPA Office of Research and Development's Water Quality and Pollution Prevention Multiyear Plans: An SAB Report
EPA-SAB-EHC/IHEC-02-004	Review of the Office of Radiation and Indoor Air's draft Methodology for ranking Indoor Air Toxics: An SAB Report
EPA-SAB-EPEC-02-005	Planning for Ecological Risk Assessment: Developing Management Objectives: An SAB Report
EPA-SAB-DWC-02-006	Candidates Contaminant List Research Plan (CCLRP): An SAB Report
EPA-SAB-RSAC-02-007	FY2003 Presidential Science and Technology Budget Request for the Environmental Protection
EPA-SAB-EC-02-008	PM Center Review
EPA-SAB-EPEC-02-009	A Framework for the Reporting on Ecological Condition: An SAB Report
EPA-SAB-EPEC-02-009a	A Framework for the Reporting on Ecological Condition: An Executive Summary
EPA-SAB-EC-02-010	Overview of the Panel Formation Process at the Environmental Protection Agency Science Advisory Board

LETTER REPORTS	
EPA-SAB-CASAC-LTR-02-001	Review of the Agency's Continuous Monitoring Implementation Plan
EPA-SAB-EPEC-LTR-02-002	Southeastern Ecological Framework: An SAB Review
EPA-SAB-CASAC-LTR-02-003	Review of the Air Quality Criteria Document for Particulate Matter: Third External Review Draft (EPA 600/P-99/002aC): A CASAC Review
ADVISORIES	
EPA-SAB-EEAC-ADV-02-001	NATA - Evaluating the national Scale Air Toxics Assessment 1996 Data: An AB Advisory
EPA-SAB-CASAC-ADV-02-002	Review of the Agency's draft Proposed Methodology for Particulate matter Risk Analysis for Selected Urban Areas; An Advisory by the Clean Air Scientific Advisory Committee
COMMENTARIES	
EPA-SAB-EEAC-COM-02-001	Importance of Maintaining the Annual Pollution Abatement Cost and Expenditures (PACE) Survey
EPA-SAB-EEC-COM-02-002	Industrial Ecology: A Commentary by the EPA Sciences Advisory Board
EPA-SAB-EC-COM-02-003	EPA Science Advisory Board (SAB) Panel Formation Process: Immediate Steps to improve Policies and Procedures
WORKSHOP REPORTS	
EPA-SAB-EC-WKSH-02-001	EPA Science Advisory Board (SAB)/EPA Workshop on the Benefits of Reductions in Exposure to Hazardous Air Pollutants: Developing Best Estimates of Dose-Response Functions
CONSULTATIONS	
EPA-SAB-CASAC-CON-02-001	Agency's Proposed Methodology for Measuring Coarse Particulate Matter: A CASAC Notification of a Consultation
EPA-SAB-EEAC-CON-02-002	Market Incentives: An EPA Science Advisory Board Notification of a Consultation
EPA-SAB-EEAC-CON-02-003	An Approach to Developing a Research Agenda for Environmental Economics: An EPA Science Advisory Board Notification of a Consultation

B3

FULL REPORTS

Review of the Science to Achieve Results (STAR) Water and Watersheds Extramural Grants Program EPA-SAB-EPEC-02-001

The STAR Water and Watersheds Review Panel of the Ecological Processes and Effects Committee reviewed the Water and Watersheds (WW) component of the Agency's Science to Achieve Results (STAR) program. STAR WW is an extramural grants program designed to complement the Agency's work on ecosystem assessment and restoration. The specific objectives of STAR WW are to: a) develop an improved understanding of the natural and anthropogenic processes that govern the quantity, quality, and availability of water resources in natural and human-dominated systems; b) develop an understanding of the structure, function, and dynamics of the terrestrial and aquatic systems that comprise watersheds; and c) promote integration across the biological, physical, and social sciences in the area of watershed management. Since 1996, approximately \$36 million in Water and Watershed grants has been awarded to academic researchers. These grants have required that the researchers use interdisciplinary teams (representing biological, physical, and social sciences) to address watershed research questions. The Panel concluded that some, but not all, of the STAR WW program's objectives have been met. The report recommends that the STAR WW program be continued and recommends mid-course corrections to enhance the effectiveness of the grants. Chief among these are recommendations that the Agency identify known information gaps that limit effective watershed management and target these for research under future RFAs; retain some, but not exclusive, emphasis on interdisciplinary projects; and far more aggressively pursue Agency plans to produce State of the Science reports that review and analyze the collective findings of STAR-funded research.

EPA Science Advisory Board FY2001 Annual Report EPA-SAB-EC-02-002

The EPA Science Advisory Board Staff's Annual Report captures the SAB's activities for FY 2001.

Review of the U.S. EPA Office of Research and Development's Water Quality and Pollution Prevention Multiyear Plans: An SAB Report EPA-SAB-RSAC-02-003

The Research Strategies Advisory Committee (RSAC) of the Science Advisory Board (SAB) met October 16 and 17th, 2001 to review the Water Quality and Pollution Prevention Multiyear Plans of the Office of Research and Development. The objective was to: a) evaluate available illustrative MYPs from a

strategic standpoint; b) to understand the extent to which major issues were being addressed, particularly in the context of the overall EPA science and research strategy; c) to identify how annual performance goals were intended to relate to measures of performance; and d) more importantly, to identify topics, themes, emerging issues, and lessons learned that could help increase the understanding and usefulness of the MYPs that are being and will be developed. The RSAC review of these two illustrative MYPs revealed a number of items and points that should be considered as these MYPs are completed and as the other MYPs are written and finalized. These included contextual information about how the particular multiyear strategy fits in the broader ORD strategy and complements the other multiyear plans, a discussion of specific measurement issues and advances that will be addressed by the strategy, information about the particular advantages of EPA's efforts in each of the broader research areas, and the relationship of the activities to be accomplished to complementary efforts conducted outside of the Agency. The Committee also felt that MYPs should explicitly address the areas of research for which they were designed and that information be included in each MYP that indicates how the efforts and deliverables are to be accomplished (e.g., by grants, contracts, in-house, etc.). Similarly, each plan would benefit from a careful consideration and clear discussion of how the long-term goals can more likely be met by addressing the most important areas of scientific uncertainty. Planners are encouraged to develop long-term goals that are not open-ended, because annual goals cannot logically meet long-term goals where desired outcomes are not clearly articulated.

Overall, RSAC found great value in these MYPs, recognizes the thoughtful and dedicated efforts that have been spent in preparing them, and considers them to be a sound and essential part of both EPA and ORD research and budget planning. RSAC strongly encourages ORD to consider seriously the comments in this report and to use them to finalize and implement these two MYPs and the remaining MYPs.

**Review of the Office of Radiation and Indoor Air's draft
Methodology for Ranking Indoor Air Toxics: An SAB Report
EPA-SAB-EHC/IHEC-02-004**

A Joint Committee of the EPA Science Advisory Board met on July 19, 2001, to review a draft methodology for generating a ranking of indoor air toxics. The methodology was developed by EPA's Office of Radiation and Indoor Air.

The Joint Committee found that the methodology used in the Ranking document appears to be appropriate for the purpose of providing a preliminary order-of-magnitude screening-level ranking for selected indoor air toxics. However, due to limitations in the available data used to generate the specific rankings, data were not available for a number of prevalent indoor air pollutants (carbon monoxide, radon, asbestos, fine particulate matter, nitrogen oxides, ozone, and environmental tobacco smoke), and pesticides appeared to be under-represented. If the Agency makes the decision to apply the methodology, the utility of the ranking results will be limited to the chemicals included. Nevertheless, even an uncertain and unstable preliminary ranking system, limited to a subset of pollutants, would usually be preferable to no ranking system use at all (random choice of pollutants for study) or a system that depends on the chemical-of-the-week syndrome or some other non-risk based set of criteria, unless information gaps significantly bias the ultimate conclusions.

The Joint Committee suggested also suggested that EPA should: state clearly the specific purposes

for which the methodology can be used be made clear; give special consideration to sensitive populations; perform a sensitivity analysis to identify factors having the greatest influence on the ranking; state clearly that lack of data for a given compound should not be taken to mean that the compound is of lesser or greater risk than compounds for which data were provided; should perform some measure of validation; and perform periodic reviews to take advantage of newly published data.

**Planning for Ecological Risk Assessment: Developing Management
Objectives: An SAB Report
EPA-SAB-EPEC-02-005**

The Ecological Processes and Effects Committee (EPEC) of the EPA Science Advisory Board reviewed the Agency's draft: *Planning for Ecological Risk Assessment: Developing Management Objectives* (EPA/630/R-01/001A, June 2001). This draft guidance document is designed to help decision-makers work with risk assessors, stakeholders, and other analysts to plan ecological risk assessments that will effectively inform the decisions they make.

The Committee was asked to respond to the following charge questions: a) usefulness of the draft and its ability to help decision-makers improve planning of ecological risk assessments; b) whether steps outlined in setting management objectives are clear, the process is logical, and key concepts are well defined; c) whether the depth of discussion and level of technical detail is appropriate; d) flexibility of the guidance; and e) effectiveness of the graphics and tables used in the draft.

While the Committee found the document to be generally useful, it provided the following recommendations for improvement: a) In order to be of optimal value to decision-makers, the focus of the document needs better definition; b) Although the general procedure that is outlined appears fundamentally sound, the description of each step and the relationships among the steps should be presented more clearly and succinctly; c) The distinction between planning in preparation for the risk assessment (which involves a wide range of participants in addition to the risk manager) and problem formulation within the risk assessment itself (which involves the risk assessor in consultation with the risk manager) should be clarified; d) The Agency should either delete or substantially redraft the section that provides advice regarding the types of ecological attributes that the objectives should consider; e) The authors should request that experienced risk managers in each of the Program offices lend their expertise and perspective to ensure the document reflects their principles and experience in developing management objectives; and f) The Agency should identify whether and how future guidance in ecological risk management will be developed.

In light of these needs and the Committee's strong support for this initiative, the Committee asked to review the revised document.

**Candidates Contaminant List Research Plan (CCLRP): An SAB Report
EPA-SAB-DWC-02-006**

The Drinking Water Committee (DWC) of EPA's Science Advisory Board (SAB) met on June 12-13, 2001 to complete its review of the Environmental Protection Agency's draft *Research Plan for the Drinking*

Water Contaminant Candidate List dated February 21, 2001. The charge to the Drinking Water Committee asked if the two-phase decision process described in the research plan has a high probability of providing information appropriate for the Office of Water's regulatory determinations for CCL contaminants. Further, it asked if the Science Advisory Board had any suggestions for improving the integrated planning of research on unregulated contaminants.

The Panel believes that the two-phase process described in the plan was understandable and has a high probability of producing appropriate information for the Office of Water's regulatory determinations on CCL contaminants. However, to be successfully implemented, more complete operational definitions will be required for many terms, concepts and criteria that are incorporated within the process. In particular, more explicit criteria need to be identified for ranking and evaluating contaminants. With regard to the critical need for criteria, EPA should begin their development by tying them to the general statutory criteria for regulatory decision making mentioned above. Finally, it will be necessary for the Implementation Team, envisioned in the plan, to have the authority, resources, time and administrative support needed to play its coordinating role.

The Panel believes that one of the research plan's strengths is in its integration of both the research decision making process with the Contaminant Candidate Listing regulatory process that it supports. This is an improvement in research planning even though it contributes to the complexity of the plan. Integration clearly shows that the two processes, regulatory and research, are inextricably linked and that the criteria to be met to move forward in the regulatory process will significantly influence the criteria for determining research needs and priorities. Because of the link between progress in the research program and movement in the regulatory program there is a need for a richer articulation of how the research and regulatory components of the overall process interact. Terms used to describe the critical decision points that are built into the processes need to be defined and criteria need to be developed for how those decisions are made in the regulatory and research components of the overall process. The Panel believes that developing operational definitions for these key terms, concepts and criteria will contribute to the achievement of the objectives of the research plan.

The Panel also recommended that in carrying out its CCL responsibilities, the Agency use current science research and established science policies to evaluate the basis for its regulatory concerns, employ a transparent decision-making approach, and make an effective use of public participation. EPA should also indicate how the research planning process will balance short-term and long-term investments to maximize public health protection;

**FY2003 Presidential Science and Technology Budget
Request for the Environmental Protection
EPA-SAB-RSAC-02-007**

The Research Strategies Advisory Committee (RSAC) of the Science Advisory Board (SAB) met February 20 and 21, 2002 to review the Science and Technology portion of the FY 2002 Presidential Budget Request for the U.S. Environmental Protection Agency. The Committee notes that both EPA and ORD have specific Strategic Plans that continue to increasingly guide their research activities. It also notes that EPA has made much progress identifying major programmatic needs, and that improvement in coordination

between ORD and the Program Offices continues. RSAC observes that there has been satisfactory progress in accounting for the impact of research efforts, and that initial progress has been made to define short-term and intermediate outcomes of the EPA ORD research activities.

RSAC is encouraged by the success of the ORD post doctoral program, but is deeply concerned with the transfer of funds that support the STAR Fellowship program to another Agency. RSAC urges the Agency and Congress to find approaches to continue funding of the STAR Fellowship Program at EPA. The other RSAC recommendations are that:

- a) EPA continue with its Science Inventory efforts which catalogue science projects and products, so as to capture and identify the extent of science being done at EPA.
- b) EPA identify specific non-regulatory driven issues of high importance to protecting human health, the environment, and ecosystems and in the next budget (FY 2004) request adequate S&T funds to address approaches to mitigate such risks.
- c) if Congress adds specific projects or programs for EPA, Congress should also appropriate the funds needed for the successful completion of the projects or programs it adds on to the S&T program budget as was done in the current fiscal year appropriations.

RSAC encourages EPA to maintain and increase the investment in research needed to meet the needs of the Agency. This is particularly important in emerging scientific areas such as genomics, proteomics and bioinformatics. RSAC continues to recommend that the Agency be vigilant in defining and maintaining the core research needed to achieve a balanced S&T research program. Further, the Committee urges the Agency to clearly explain to OMB and Congress that the only way it will be possible to meet its expanded responsibilities while improving the quality of the science used, is for the S&T budget to be maintained and increased over time.

PM Centers Review EPA-SAB-EC-02-008

The PM Centers Interim Review Panel (Panel) of the US EPA Science Advisory Board (SAB) met on February 11-12, 2002 to review the Agency's PM Research Centers program as a mechanism for generating research results that can inform Agency decision-making. Its major findings and recommendations were as follows:

1. Overall, the Panel found that the program merits continuation beyond FY04 -- through a new, fully-competitive round of applications -- as one part of a diverse PM research portfolio at the Agency.
2. The Panel identified several specific advantages that the Centers approach offers over more traditional research mechanisms, including enhanced flexibility and adaptability leading to improved timeliness, ability to conduct higher-risk pilot and validation efforts, study designs enhanced by intra-center multi-disciplinary integration, and improved leveraging of the Agency's and the Centers' research resources.
3. The Panel identified several ways in which a new round of Center grants could be enhanced, either by expanding upon activities already underway or by undertaking new efforts. Importantly, the Panel

noted that while there are evident benefits of integration within and across Centers, there are also challenges to insure that the work of the Centers does not become isolated from that of other researchers within the Agency and in the academic community.

A Framework for Reporting on Ecological Condition: An SAB Report EPA-SAB-EPEC-02-009

The Ecological Processes and Effects Committee (EPEC) of the EPA Science Advisory Board reviewed the framework for assessing and reporting on ecological conditions. To accomplish these tasks, the Agency would benefit from development of a systematic framework for assessing and reporting on ecological condition. The framework would: help assure that the required information is measured systematically by the Agency's programs; provide a template for assembling information across Agency programs and from other agencies; and provide an organizing tool for synthesizing large numbers of indicators into a scientifically defensible, yet understandable, report on ecological condition.

The purpose of this report is to provide the Agency with a sample framework that may serve as a guide for designing a system to assess, and then report on, ecological condition at a local, regional, or national scale. The sample framework is intended as an organizing tool that may help the Agency decide what ecological attributes to measure and how to aggregate those measurements into an understandable picture of ecological integrity.

The SAB framework provides a checklist of ecological attributes that should be considered when evaluating the health of ecological systems. It also provides an organizational scheme for assembling hundreds of individual parameters into a few understandable attributes. We hope that the SAB framework will foster more systematic collection of ecological information by the Agency, provide a locus for integrating that information among programs both within and outside the Agency, and catalyze a trend towards environmental reporting that addresses the essential attributes of ecological systems.

Ecological systems are complex, and it has proved extremely difficult to answer the holistic questions that people ask about them: How healthy is my watershed? Will native species be here for my children and grandchildren to enjoy? With this report, we provide a way to integrate scientific data into the information necessary to answer these questions, and ultimately to foster improved management and protection of ecological systems. We look forward to your response to this report, and we would welcome the opportunity to discuss these issues further with you as the Agency moves forward with a report on the state of the environment.

A Framework for Reporting on Ecological Condition: Executive Summary EPA-SAB-EPEC-02-009a

This report is the Executive Summary for A Framework for Reporting on Ecological Condition. There is no abstract for this report.

**Overview of the Panel Formation Process at the Environmental Protection Agency Science
Advisory Board
EPA-SAB-EC-02-010**

This booklet provides a general introduction to the U.S. Environmental Protection Agency (EPA) Science Advisory Board (SAB) and one key part of its advisory process: forming advisory panels and making decisions about conflict of interest and balance among panelists. Although each SAB project is different, the process of panel formation follows the same basic steps.

The SAB also plans to develop companion booklets that will give an overview of the other key steps in the advisory process, such as choosing projects; panel deliberations and report writing; the respective roles of the Executive Committee, standing committees, and special panels; the role of the SAB Staff; and communication.

The Board plans to provide more detailed information on each of those topics. It is planning to develop more detailed information for panel chairs; members of the public interested in participating in the SAB advisory process; and Agency staff interested in working with the SAB on topics of special interest to them.

LETTER REPORTS

**Review of the Agency's Continuous Monitoring Implementation Plan
EPA-SAB-CASAC-LTR-02-001**

The Subcommittee on Particle Monitoring of the Clean Air Scientific Advisory Committee (CASAC) reviewed the draft document *Continuous Monitoring Implementation Plan* prepared by EPA's Office of Air Quality Planning and Standards (OAQPS) and provided advice on implementation of EPA's continuous PM monitoring program. The CASAC was asked to respond to the following charge: a) program strengths; b) areas of concern; and c) any recommendations that might optimize implementation of the PM continuous mass program.

After discussion between the Subcommittee, the OAQPS staff, and others present at the meeting, we agreed that the document presented a reasonable framework for the use of continuous monitors. However, the Subcommittee is concerned that the process as currently outlined puts a heavy burden on the state or local air quality agencies to demonstrate REM. This effort may be more than can be mounted by many such organizations. The Subcommittee suggested an interim approach that can be used as EPA evaluates this process.

The Subcommittee would like to compliment the OAQPS staff for their efforts in developing the present document. It is clear that we are all working at finding approaches that will permit the use of continuous monitors that will provide more detailed data while ensuring that we are continuing to provide rigorous tests of air quality with respect to attainment of the PM_{2.5} NAAQS.

Southeastern Ecological Framework: An SAB Review
EPA-SAB-EPEC-LTR-02-002

The Ecological Processes and Effects Committee (EPEC) of the EPA Science Advisory Board established a panel to review Region 4 Southeastern Ecological Framework (SEF). This document is a decision support system intended to identify remaining natural areas in the southeastern U.S. of highest value for conserving regional biodiversity.

The Committee was asked to respond to the following charge questions: a) whether the Florida Ecological Network approach is consistent with modeling an ecological framework for a region; b) whether the data layers used in developing the Southeastern Ecological Framework sufficient to indicate ecological integrity; c) would a similar model or approach be applicable for developing a framework for the U.S.; d) would additional or alternate data layers will be needed for a national framework; e) modifications needed to increase the utility of the approach as a decision support tool in meeting EPA's program activities and GPRA goals; f) discuss what linkages between various indicators and EPA programs or control authorities may help to elevate the use of SEF as a decision support tool.

While the Panel recognizes and praises the significant efforts that have gone into the Southeastern Ecological Framework, the Panel provided the following recommendations for improvements: a) the Panel recommends that the SEF be enhanced to include a wider range of ecological attributes that are important to regional ecological integrity; b) the Panel recommends that the process for setting criteria to select priority lands be made explicit and that the criteria and the individual data layers used in the SEF receive additional peer review; c) with the caveats noted, the Panel agrees that application of the SEF approach would be beneficial in other regions of the U.S., although different data layers and/or different criteria for selecting priority areas likely would be needed.

The Panel applauds the designers of the Southeastern Ecological Framework for an important effort. We recommend that the Agency consider additional enhancements and peer review of the product to further improve its utility to Agency decisions in EPA Region 4.

Review of the Air Quality Criteria Document for Particulate Matter:
Third External Review Draft (EPA 600/P-99/002aC): A CASAC Review
EPA-SAB-CASAC-LTR-02-003

The Clean Air Scientific Advisory Committee (CASAC) reviewed the two-volume April 2002 draft document, *Air Quality Criteria for Particulate Matter - Third External Review Draft* in a public meeting in Research Triangle Park, NC on July 18-19, 2002.

While noting that the this draft of the Criteria Document is a significant improvement over prior versions, the CASAC could not come to complete closure on this draft document (although some chapters of the draft were tentatively closed) and requested that the Agency revise the draft for another review. Areas of Committee concern include the following: a) the statistical problems that have recently been identified with some of the epidemiological studies, specifically the daily time-series studies of both

morbidity and mortality using generalized additive models (GAMs); b) the evaluation of the epidemiology; c) chapter summaries are too much of a point-by-point recapitulation of the material in the chapters rather than a summary of the key points; d) the avoidance of any substantive discussion of the close relationship between light extinction and fine particle mass concentrations; d) the need for a better discussion of visibility, climate change; and economic evaluation; e) the need for additional literature citations and discussion in a number of areas noted in the CASAC report; and f) with respect to Chapter 9 (Integrative Summary), the National Research Council (NRC) committee paradigm is presented, but the chapter is organized to address the PM Committee's questions rather than its paradigm.

COMMENTARIES

Importance of Maintaining the Annual Pollution Abatement Cost and Expenditures (PACE) Survey EPA-SAB-EEAC-COM-02-001

This Commentary was developed by the Environmental Economics Advisory Committee (EEAC) of the EPA Science Advisory Board (SAB) subsequent to a discussion with staff of the U.S. EPA's National Center for Environmental Economics and other Agency officials at the EEAC's public meeting on November 30, 2001.

The EEAC noted their concern that time and resource constraints might prevent or delay implementation of the next PACE cycle. This was considered to be linked to the need for an evaluation of the PACE Survey instrument, the concurrent need to begin the next data collection cycle, and the limitations on resources available to conduct the survey. The Committee noted its views on the importance of maintaining an uninterrupted, annual PACE Survey, to provide continuous plant-level data. The EEAC further noted that the PACE Survey has significant spill-over benefits affecting the various program offices in the Agency, and a number of other agencies and suggested that the cost of the Survey should be shared with offices across and even outside of EPA.

Industrial Ecology: A Commentary by the EPA Science Advisory Board EPA-SAB-EEC-COM-02-002

This commentary on Industrial Ecology was prepared by the Environmental Engineering Committee (EEC) of the EPA Science Advisory Board.

The commentary addresses Industrial Ecology, a systems approach to environmental analysis. Industrial ecology seeks to address not just industrial emissions, and not just specific products, but the complex networks of services, products, and activities that make up our economy. It emphasizes opportunities for new technologies, new processes, and economically beneficial efficiencies.

The purpose of this Commentary is two-fold: first, to bring industrial ecology to the attention of a wider audience within EPA and other agencies as an approach to meeting their missions, and second, to articulate key research needs. The SAB believes that industrial ecology could help EPA to address some of the core challenges of environmental policy, from climate change to waste management to land use policy. Achieving this potential will require rigorous research and a firm grounding in science and engineering.

This identifies the need for better understanding of the potential and limitations of a range of promising approaches including:

- a) technological innovation
- b) voluntary and cooperative approaches to environmental management
- c) substitution of services for products
- d) recycling and reuse
- e) reduction in the amounts of materials used in products
- f) substitution of scarce resources with those that are plentiful

**EPA Science Advisory Board (SAB) Panel Formation Process:
Immediate Steps to Improve Policies and Procedure
EPA-SAB-EC-COM-02-003**

This Commentary informs the Administrator and the public of new processes that the SAB will be using for panel formation. The new procedures are designed to ensure that SAB panelists are independent and that the panels are properly balanced; designed to make the panel formation process more transparent to the public, and designed to gain the benefit of public involvement in forming panels at the SAB.

ADVISORIES

**NATA-Evaluating the National Scale Air Toxics Assessment 1996 Data: An SAB Advisory
EPA-SAB-EEAC-ADV-02-001**

This advisory provides a response to a request by the Agency to the EPA Science Advisory Board's (SAB) Executive Committee, to review the initial (for the year 1996) National-Scale Air Toxics Assessment (NATA) developed by the EPA/Office of Air Quality Planning and Standards (OAQPS). The major review meeting took place on March 20 & 21, 2001, with public teleconferences held prior to and following this meeting.

The Panel found that the Agency has done a very good job in assembling and using available data and models for the 1996 NATA, and that the integration of this information represents a significant advancement in the national capability for air toxics assessment, and provides focus and motivation for ongoing improvements. However, the limitations in the available data and scientific understanding are such that the NATA results cannot yet be used for regulatory purposes. Topics reviewed in the advisory deal with the National Toxics Inventory (NTI), model issues (specifically for ASPEN and HAPEM4), dose-response information, risk characterization, diesel emissions, uncertainty analysis, communication of results, use in future benefits assessments, and future research priorities. The Panel provided advice and recommendations for the 1996 NATA, as well as for the 1999 and subsequent NATAs, including 56 specific recommendations that can be used by the Agency to track its response to this advisory. The Panel emphasized that an expanded set of measurements and research is needed to further advance, evaluate and develop confidence in the models and the associated exposure and risk estimates.

**Review of the Agency's draft *Proposed Methodology for
Particulate Matter Risk Analysis for Selected Urban Areas*;
An Advisory by the Clean Air Scientific Advisory Committee
EPA-SAB-CASAC-ADV-02-002**

The Clean Air Scientific Advisory Committee (CASAC) Particulate Matter Review Panel reviewed the EPA draft document *Proposed Methodology for Particulate Matter Risk Analysis for Selected Urban Areas* that outlines part of the procedures to be used in preparing the human health risk assessment for PM_{2.5} that will accompany the Staff Paper on the National Ambient Air Quality Standards (NAAQS) for Particulate Matter (PM) that will be released later this year.

In its review, the Panel noted the importance that this risk analysis has in the primary standard setting process for PM. The Panel concluded that the general methodology as described in the report is appropriate. It recognizes the need to use concentration/response functions to obtain risk estimates in a series of locations. The Panel offered a number of comments that relate to the details of application of the method.

The Panel believes that the basic process is sound and provides a number of suggestions in this report and in the appendix to refine the analyses that are to be done.

WORKSHOP REPORTS

EPA Science Advisory Board (SAB)/EPA Workshop on the Benefits of Reductions in Exposure to Hazardous Air Pollutants: Developing Best Estimates of Dose-Response Functions EPA-SAB-EC-WKSHP-02-001

On June 22 and 23, 2000, EPA and the Science Advisory Board co-sponsored a public Workshop on "the Benefits of Reductions in Exposure to Hazardous Air Pollutants: Developing Best Estimates of Dose-Response Functions." The workshop was not an advisory committee meeting, organized with the purpose of providing advice to the Agency. Instead, it was a public meeting designed to explore possible new methods for monetizing benefits of reducing exposures to hazardous air pollutants, a class of pollutants identified in the Clean Air Act as known to cause or suspected of causing cancer or other serious human health effects, such as birth defects, neurological damage, and respiratory disease. EPA explicitly sought a broad spectrum of views at the workshop and did not seek a consensus recommendation from workshop participants.

The workshop was chaired by Dr. Michael Kleinman from the College of Medicine, University of California, Irvine, California and brought together expert discussants in the fields of economics, health science, and risk assessment. The workshop took a case study approach that showcased possible new ways of providing risk assessment information for benzene, perchloroethylene, and manganese. Many specific options emerged in the white papers presented for those chemicals and in the discussion that followed, but no consensus was reached on methods that would satisfy the concerns of health scientists and risk assessors, yet meet the needs of economists for benefits assessment. The report includes the full text of the white papers developed for the three chemicals discussed and the white paper documenting the information needs of benefits assessors. The report also documents the major strategies identified for bridging the gaps between economists and health scientists and the written comments provided by the expert panelists.

B4

SAB REPORTS AND NOTIFICATION OF SAB MEETINGS

Single copies of any SAB report, including, this document can be obtained by writing or faxing your request to:

EPA Science Advisory Board (1400A)
Committee Evaluation and Support Staff
U.S. Environmental Protection Agency
1200 Pennsylvania Avenue, N.W.
Washington, DC 20460
Fax: (202) 501-0256

You can also find copies of this document and other SAB documents on the SAB Website at URL:
<http://www.epa.gov/sab>.

In addition, you can subscribe to the SAB Listserver and automatically receive copies of all Federal Register notices announcing SAB Meetings, together with brief descriptions of topics to be covered at the meetings. These notices will be mailed to you within 24 hours of their publication in the Federal Register.

To subscribe, simply send the following message, inserting your name,
Subscribe epa-sab FIRST NAME LAST NAME
to
listserver@unixmail.rtpnc.epa.gov

B5

ABSTRACTS OF THE SAB LECTURE SERIES SCIENCE & THE HUMAN SIDE OF ENVIRONMENTAL PROTECTION Summary of Activities 2001-2002

In Fiscal Year 2002, the EPA Science Advisory Board hosted a lecture series, "Science and the Human Side of Environmental Protection." The Board began the series in 1999 to strengthen the capacity of EPA and to use social sciences to address environmental protection problems. The series aimed to highlight how the social sciences can help solve actual environmental problems. Each session featured a lecture, followed by a discussion led by a senior Agency manager.

2001-2002			
Speaker	Topic	Social or Behavioral Science	Agency Commenter
Dr. Douglas MacLean, University of North Carolina	Successes and Failures of Environmental Ethics: How Do Environmental Values Apply to Environmental Decisions?	Philosophy	Mr. Thomas Gibson, Office of Policy, Economics and Innovation
Dr. Elinor Ostrom, Indiana University	Ecological Diversity and the Need for Institutional Diversity	Political Science	Mr. John Meagher, Office of Water
Dr. Susan L. Cutter, University of South Carolina	Geographical Dimensions of Environmental Inequities	Geography	Mr. Charles Lee, Office of Environmental Justice, and Mr. David Wolf, Office of Environmental Information
Dr. Robin Cantor, LECG, Washington, DC	Issues in the Economic Appraisal of Ecological Value and Damages	Economics	Dr. Angela Nugent, Science Advisory Board, leading a group discussion of the planned Board Project Valuing the Protection of Ecological Systems and Services

DR. DOUGLAS MACLEAN

"THE SUCCESSES AND FAILURES OF ENVIRONMENTAL ETHICS: HOW DO ENVIRONMENTAL VALUES APPLY TO ENVIRONMENTAL DECISIONS?"

On November 16, 2001, the SAB hosted the first lecture in the third year of its series, "Science and the Human Side of Environmental Protection." The presenter was Dr. Douglas MacLean, Professor of Philosophy at the University of North Carolina at Chapel Hill and participant in the Carolina Environmental Program, an interdisciplinary initiative of The University of North Carolina at Chapel Hill designed to promote innovative approaches to the study of the environment. Dr. MacLean spoke on the topic "The Successes and Failures of Environmental Ethics: How Do Environmental Values Apply to Environmental Decisions?" Fifteen people from five Headquarters Offices and one region participated.

Dr. MacLean began his presentation by describing the appreciation he gained for economic methods through his work on the Valuation Committee that contributed to the SAB report, *Towards Integrated Environmental Decision Making*. Criticism of economic methods may be popular, but it is difficult to identify alternatives useful to decision making. He linked this experience to the focus of his talk, the failures and potential successes of environmental ethics for decision making. The SAB experience led to his interest in deepening his understanding of environmental values behind different views and in decision making.

To start his talk, he proposed as "a given" that it is a shared view that decision making should reflect environmental values. It is difficult, however, in his view, to articulate these values. In addition, philosophers have complicated the discussion in ways that have not proved useful for decision makers. One view of values, as characterized by philosophers, can be described as "naive anthropomorphism," which views the benefit of humans as the sole justification for environmental protection. Benefit-cost analysis is a legacy of this view, even though it has increased in sophistication to address "existence values" for ecological resources, as well as "use values." Other views of values are: "biocentric views" (which consider sentient beings that "can suffer" as having value); views that identify non-conscious living things (such as water resources) as having intrinsic value; or views based in "deep ecology" (which identifies "things of nature" as having intrinsic value). All these views present an assortment of problems for decision makers. Of great interest to Dr. MacLean is the way in which different views detach what is valued (or what is "cared about") from the reasons for caring. These reasons, he argued, provide the rich information about values that is most useful for decision makers. Different reasons behind values have different importance and can provide important inputs for decision making. Humans have reason and the need to explain why we care and care in different ways.

He argued that the distinction drawn by many philosophers between inherent and instrumental values is a false dichotomy and introduces confusion into the policy discussion. "Things" can be valued as ends, but that does not necessarily mean that they are valued for their intrinsic worth. Why they are valued may differ: something, like labels or pencils, may be valued, but for reasons an individual cannot explain in ways understood by others (fetishistic value); something may be valued for reasons that can be understood but not shared (e.g., collecting coffee makers); and something can be valued in ways that are commonly understood and shared (for which most people feel a "pull;" and for those who don't, society feels "something is missing", e.g., valuing a car so one could help others). These differences in the reasons behind values are important. They differentiate "values" from preferences and provide policy makers with

insights for making decisions.

The major policy implication of this insight is that decision makers need to ask people why they value things the way they do and to listen to their answers. He also discussed other policy applications. Policy makers need to recognize, emphasize and communicate that a decision expressed as a "willingness to pay" X number of dollars for something, doesn't establish a "value" of X dollars. Policy makers also need to recognize that the values that they express carry symbolic weight in the society, so that the reasons for the values associated with their decisions need to be especially clear. Finally, he called for policy makers to develop procedures for public deliberation about environmental values. He saw a need for public dialogue on the reasons for caring about environmental protection. Procedures for deliberation would allow participants to express the reasons behind their values and assist with collective decision making. Progress in this area, he believed, would also help benefit-cost analysis become a more effective tool.

Mr. Thomas Gibson, Associate Administrator for the Office of Policy, Economics, and Innovation (OPEI), started the post-presentation conversation with several questions. He asked how the approach Dr. MacLean described would work in the EPA context, where most decisions involved pollution control issues, subject to statutory standards, as opposed to natural resource management. Dr. MacLean responded that values associated with protecting health might be more clear cut than values associated with ecological resources, where the ethical issues were more complex.

Mr. Gibson then asked Dr. MacLean to comment on the Executive Order requirements to use cost/benefit analysis and whether he saw cost/benefit as being used for making public policy decisions. Dr. MacLean saw the issue of how to use cost/benefit analysis as a key question. Is it to be used appropriately as an algorithm or as an aid to decision makers? He cautioned against using cost/benefit analysis to envelope all considerations of values. People resist it; they are skeptical of its limits; and if the analytical tool begins to lay claim to incorporating all values, it will be difficult to resist its being used as an algorithm. Instead, he suggested using the tool for capturing benefits most amenable to monetization and acknowledging that it isn't being used to capture the whole moral universe.

Mr. Gibson asked about the gap between expert assessments of risks and the values the public places on risk. He asked about the government obligation to help with reducing this gap. Dr. MacLean responded that it is appropriate to consider the mission of the Agency. Is the mission to "protect the public" or "satisfy the public"? He referred to the psychological literature on how people learn and how they assign risks. He stated that the Agency has "an important job" in public education to direct attention to "what is not so visible." Where there are public processes, "you can't be neutral administrators." There is a need for education, for help in processing complex information in the right way.

Mr. Gibson then asked about how the public participation model introduces biases into a decision making process and how those biases compared with the biases of cost-benefit analyses. Dr. MacLean acknowledged that stakeholder groups have biases, but that there were approaches used by pollsters and others that ensure random samples. Their expert methods could be used in designing processes for value elicitation. In addition, steps must be taken, as well, to protect against biases introduced by "framing" and elicitations for the willingness-to-pay information used in cost-benefit analysis.

The broader group then joined the discussion. Staff from OPEI commented that Dr. MacLean's talk

suggested that the Agency may benefit from taking a more structured approach when talking about values with the public. Staff from the Office of Water asked about different values expressed toward natural and man-made hazards. Dr. MacLean responded that it may be useful to probe to understand these reasons better. SAB Staff asked about how to foster better communications between ecologists and economists. Dr. MacLean answered that it may be useful to involve specialists from other disciplines, who can often make the discussion more productive by facilitating the conversation between the two groups.

The group touched on several other questions. One member pointed out the potential usefulness of Lester Brown's planned work at the new Earth Policy Institute that has resulted in the book "Eco-Economy: Building an Economy for the Earth." Another member asked about where the "moral imperative" was in the context of Dr. MacLean's discussion. Dr. MacLean responded that he has sympathy for views that challenge Americans to increase reverence for natural resources and view themselves as part of a natural environment. Another participant asked about how EPA might communicate its limits to address values that might be different from those established in the Agency's governing laws. Dr. MacLean answered that the Agency should communicate very clearly the values and reasons behind the choices made. He emphasized again the symbolic importance of the choices and values expressed by the Agency and the need for a strong Agency role in public education. In response to questions, Dr. MacLean acknowledged areas he did not discuss in this talk, including professional ethics and environmental justice. Dr. MacLean closed the discussion by stating a personal goal that environmental professionals at EPA step back and think about environmental values and how to bring them into discussion. He reiterated that moral values are not easily quantifiable and they are attached to reasons we give for caring in the ways we do. He encouraged the Agency to find procedures for people to express the reasons behind those values, and to explore where those reasons lead.

Dr. MacLean provided a brief bibliography of related articles that may be of interest to EPA staff interested in pursuing ideas discussed during the lecture and discussion:

"The Ethics of Cost-Benefit Analysis: Incommensurable, Incompatible, and Incomparable Values," in *Democracy, Social Values, and Public Policy*, ed. M. Carrow, R.P. Churchill, and J. Cordes, (Westport, CT: Praeger, 1998), pages 107-122.

"Environmental Ethics and Human Values," in *Handbook for Environmental Risk Decision Making: Values, Perceptions, and Ethics*, ed. C. Richard Cothorn (Chelsea, MI: Lewis Publishers, 1995), pages 177-193.

"Cost-Benefit Analysis and Procedural Values," *Analyse & Kritik* 16 (1994): 166-180.

"Environmental Values and Economic Tradeoffs," in *Environmental Risk, Environmental Values, and Political Choices*, ed. J. Gillroy, (Boulder: Westview Press, 1993).

"Conservatism, Efficiency, and the Value of Life," (co-authored with Claudia Mills) in *Nothing to Fear: Risks and Hazards in American Society*, edited by Andrew Kirby, (Tucson: University of Arizona Press, 1990), pages 53-74.

"Comparing Values in Environmental Policies: Moral Issues and Moral Arguments," in *Valuing Health Risks, Costs, and Benefits for Environmental Policy Making*, edited by P. Brett Hammond and Rob Coppel, (Washington, DC: National Academy of Sciences Press, 1990): 83-106.

DR. ELINOR OSTROM
"ECOLOGICAL DIVERSITY AND THE NEED FOR INSTITUTIONAL DIVERSITY"

On February 22, 2002, the U.S. Environmental Science Advisory Board (SAB) hosted the third lecture in the third year of its series, "Science and the Human Side of Environmental Protection." The presenter was Dr. Elinor Ostrom, Arthur F. Bentley Professor of Political Science, at the Center for the Study of Institutions, Population and Environmental Change and the Workshop in Political Theory and Policy Analysis at Indiana University, Bloomington. She spoke on the topic "Ecological Diversity and the Need for Institutional Diversity." Thirty people from four Headquarters Offices, four regions, and two ORD laboratories participated, as well as three invited guests from outside the Agency.

Dr. Ostrom began her talk by acknowledging the growth of serious and appropriate interest in preserving diversity of ecological systems. Less well known, she stated, was research documenting the success of local efforts to use resources and preserve biodiversity (e.g., farmer-managed irrigation projects, in-shore fisheries, forest plans) that have been designed by users. In addition, national efforts to address biodiversity issues have sometimes caused major problems. She called for a serious effort to conserve "institutional diversity" as policy makers consider how to preserve ecological diversity.

In her view, the working assumptions of contemporary policy draw on a "narrow model of the individual" for representing public attitudes and a contrasting "enlightened model" for public policy makers. She argued, in contrast, that empirical research shows neither that the public fits the model of *Homo Economicus* (a norm free, short-term maximizer of selfish gains), nor that public policy makers know how to maximize public interest through designing optimal rules that work in the public interest. She stated that research shows the assumptions underlying the "Tragedy of the Commons," where an unregulated pool of common resources is assumed to be overused or destroyed if it is not subject to government control or privatization, are incorrect and a poor foundation for public policy.

The Workshop in Political Theory and Policy Analysis has collected thousands of cases that show how local users sustainably manage local resources. The Workshop has also documented local cases of failure. Where users have been successful, they have developed a secure relationship with biological resources through organizing their own rules, rules that frequently are "invisible" to outsiders who do not see how they are embedded in local culture and practice.

To build on this body of research for policymaking, Dr. Ostrom argued that scholars and decision makers should build and use a "better model of the individual." Instead of envisioning the public as a simple *Homo Economicus*, policy makers should have an understanding of the public as "boundedly rational," with a capability to learn social rules; where reciprocity is a key norm supported by trust and understandings of reputation; and where legal rules can enhance reciprocity.

The case studies suggest that there are attributes of resources and of the appropriators of resources that are linked to the successful sustainable management of those resources: 1) the resources must be perceived as feasible to be improved (i.e., resource units are not at a point of deterioration such that is useless to organize to improve their use, or they are so underutilized that there is little advantage from organizing); 2) reliable and valid indicators of the condition of the resource system are available at relatively

low cost; 3) the flow of resource units is relatively predictable; and 4) the resource system is sufficiently small, given the transportation and communication technology in use, that appropriators can develop accurate knowledge of them

In cases where successful management occurs, appropriators (i.e., users) of the resource are most likely to have these characteristics: 1) to be dependent on the resource system for a major portion of their livelihood or value it highly for other purposes; 2) to share an image of how the resource system operations and how their actions affect each other and the resource system; 3) to use a low discount rate in relation to future benefits to be achieved from the resource; 4) to include powerful individuals among those adversely affected by a lack of coordinated patterns of appropriation and use; 5) to trust one another to keep promises; 6) to have the autonomy needed to determine rules without external authorities countermanding them; and 6) to have some prior organizational experience.

Dr. Ostrom described how her workshop has modeled these characteristics mathematically and combined them into models of benefits and costs that describe different cases. She stated that the greatest scientific challenge is to develop accurate measures of the characteristics of resource and people involved in cases. One way the Workshop in Political Theory and Policy Analysis at Indiana University is meeting this challenge is by laboratory experiments on groups. A key finding of those experiments, as well as the case studies they have collected, is that communication is the biggest factor that affects people's abilities to manage common pool resources. When information exchange and communication happen, appropriators of resources can establish successful rules.

Dr. Ostrom then turned to the topic of how "larger regimes" interact with local systems to manage resources. She suggested that larger regimes would have more success if they acknowledged the long-term benefits of locally established systems; if they facilitated exchanges within and between local systems; if they supported monitoring of local resources and respected local knowledge about the resource. She acknowledged the necessity of "polycentric" regimes that would operate at multiple levels and there is a need to study empirically what leads to successful outcomes when local, regional, national, and global entities interact to manage common resources.

She concluded her presentation with a set of challenges for researchers, policy makers, and resource users.

She called on researchers to conduct in-depth case studies to understand complex interactions in field setting. She emphasized the importance of studies with a large number of cases to test the relative importance of different variables. She called for experimental studies in the laboratory and long-term studies of individual cases.

She stated that policy makers need to develop: 1) legal environments that enable people to take responsibility; 2) sources of accurate information about resource conditions; 3) fair, low-cost courts that allow quick resolution of differences; 4) policies and programs that enhance benefits for local users; and 5) efforts to find mutual interests across national, state, and local levels.

She called on resource users to: 1) create associations to share information; 2) to search for ways of increasing the benefits of working together and find ways of reducing the costs; and 3) draw on local

knowledge to find innovative institutions that fit local conditions.

Mr. John Meagher, Director of the Wetlands Division in EPA's Office of Water, who had been asked to begin the discussion with his comments, made several observations. He commented first on the cyclical nature of policies to protect water quality. After World War II, the nation had turned to national programs involving engineering solutions to address water pollution problems that local and state governments had not solved. In the last 10 years, he noted a growing sense that the nation has reached the limits of those national programs and is turning to watershed management to address problems that ranged from runoff from farms to sprawl. The U.S. EPA is part of this effort, promoting watershed management against the backdrop of the Clean Water Act.

To make local efforts work within a national and global context, he noted, was a real problem. How do local efforts relate, for example, to global scale problems like Global Warming? Where are global approaches appropriate? Whaling issues came to mind. Can Dr. Ostrom's model work when local needs are extremely basic, so low on Maslow's hierarchy of needs that people cannot meet their basic physiological needs? How can local users be educated about endangered species that might be seen by them as external to the use of local resources? How can governments promote the use of good information for decisions, given local conflicts about the data and information on which decisions are based, such as the disputes between Virginia and Maryland on local fisheries issues?

Dr. Ostrom responded that a key to some of these local issues is empirical information. For example, actual information about who owns lands and how they use it for different purposes may help to solve problems. Assumptions about local values and behavior may not match reality. In Indiana, for example, there was a policy issue regarding chopping large tracts of land into small plots. Researchers in her Department surveyed a sample of 250 landowners who owned more than 5 acres. The research showed that individuals who owned fairly large amounts of land (50-1000 acres) were more responsive to price fluctuations in the timber market; they were land rich and cash poor. Holders of small amounts of land, 5-10 acres, tended to be owned by professional people who managed the land in an ecologically sensitive way.

She suggested that often policy makers have a simplistic view of landholding alternatives as either state forests or industrial uses. She encouraged decision makers to set up systems, like ecologically friendly zoning, that respond to private needs.

The broader group then joined the discussion. The first question addressed the experience of other countries: has any one other country "got this right?" Dr. Ostrom suggested that the United States could learn a lot from Switzerland, which has sustained a rich mix of public and private institutions for managing resources for 1,000 years. A contrast would be the experience in Canada, where the Canadian Government dismissed local fishermen's concerns about the loss of small fish. Canada is now trying to rebuild local confidence in government data, by sending harvesters out on scientific boats on a regular basis.

The next question concerned how the characteristics and attributes Dr. Ostrom described related to experience in urban areas and neighborhoods. Dr. Ostrom replied that she had conducted research on urban policing as a production function of a local public good. She conducted this research in response to a proposal in the 1960's for a massive consolidation of policing within metropolitan areas. Her research

showed that complex systems, involving locally provided police services, outperformed simple systems where policing functions were consolidated.

The next question asked about the relationship of environmental issues and policies to the "classic resource" problems addressed by Dr. Ostrom's research. Within Dr. Ostrom's framework, environmental groups were hard to characterize; they were both resource users and decision makers. Dr. Ostrom agreed that environmental groups are indeed hard to classify and would benefit from analysis to understand better what they are and how they work. Dr. Nives Dolsak, a colleague of Dr. Ostrom at Indiana University, who had conducted research on collective action to address environmental issues, stated that her work suggests that it is easier to develop successful institutions to address resource concerns than to manage the "bads" of pollution. There were, however, many cases where users have organized themselves to address pollution; she suggested that a key example is the effort of North East States to address ground-level ozone pollution.

The final question concerned where work on large-scale systems was successful. EPA staff suggested that the Great Lakes National Program Office has been effective working at a regional and international scale and that the Chesapeake Bay Program has made progress on air issues. Dr. Ostrom responded that Dr. Mark Spool Jones at McMaster University had studied the Great Lakes experience in detail.

DR. SUSAN L. CUTTER
"GEOGRAPHICAL DIMENSIONS OF ENVIRONMENTAL INEQUITIES"

On January 24, 2001, the EPA Science Advisory Board (SAB) hosted the second lecture in the third year of its series, "Science and the Human Side of Environmental Protection." The presenter was Dr. Susan L. Cutter, Carolina Distinguished Professor of Geography at the University of South Carolina. Dr. Cutter spoke on the topic "Geographical Dimensions of Environmental Inequities." Forty-four people from five Headquarters Offices and six regions participated, along with two invited guests in regional offices.

Dr. Cutter began her presentation by distinguishing between environmental equity, a study of the disproportional effects of environmental degradation on people and places; environmental justice, a political charged term relating to the need to act to correct an injustice imposed on a specific group; and environmental racism, which refers to discrimination in policy making, enforcement, or environmental leadership. She stated that her talk was focused on identifying environmental inequity -- and on answering the question "What are the causes of environmental inequity?" Those causes might be "outcome"-related (i.e., the sources of environmental threats might be located in communities because they were poor, minority, or politically weak) or result from different "processes" (i.e., threats that arose in communities with little reference to race or economic status and then the demographics changed).

In her view, analyses of environmental justice have historically focused primarily on race and income categories as the primary ways to study environmental inequities. She suggested that environmental inequity can take many different forms. It can appear as different impacts by age, gender, or other social categories; it can appear as impacts that differ across generations; and it could be caused by "procedural" issues, when different groups are affected disproportionately by policies or have different access to remedial

procedures.

Geographic analysis can help understand the nature of environmental inequities. Dr. Cutter's own work has focused what "Dumping in Dixie" really means. Geographic analysis can show the source of exposures; it can illustrate demographic changes over time and space that show how a population may have changed in terms of income, race or age; and it can highlight different exposures in different places.

Proving environmental injustice, however, presents significant analytical challenges. Much of the analysis depends on precise location of environmental threats. Available environmental data often have imprecise geographical coordinates and are interpreted imprecisely. Environmental exposures can differ markedly, for example, when the site of a corporate headquarters, rather than a facility is used for analysis. Even how one identifies the borders of these exposures can have a profound effect on the analysis -- whether one uses a model that bounds exposures by arbitrary boundaries developed for pre-existing purposes (e.g., a "host/non host model"); the more commonly-used buffering concept; or the "buffering with distance decay of exposure" approach that her team uses.

The historical literature analyzing environmental justice shows the need to be precise and consistent in identifying the environmental threat of interest. Exposures for people of color and lower income appear to be different, when Dr. Cutter's team mapped Toxic Release Inventory reports for those populations and compared that data with exposures to acute releases for the same populations. She suggested that it was important for policy makers to understand the nature of the environmental threats analyzed, and to put them in context with other environmental threats with possible different impacts.

An additional challenge to anyone analyzing environmental inequities is the choice of appropriate geographic scale. Demographic data often, but not always, is released at the census-block scale, but environmental release data often are not available in units that small. Scaling-up data introduces uncertainties that need to be considered in any conclusions drawn from the data.

Geographic analysis of inequities also depends on the subpopulations selected for focus. There are methods for analyzing differential environmental impacts on areas with high percentages of children as part of the population. In Dr. Cutter's view, "all too often we get mired in looking only at communities of color and low income and forget other social groups."

Meaningful geographic analysis also depends on a critical examination of the time frame of the data used in the analysis. Analysts need to compare the history of introduction of environmental threats with the historical demography of a place to see how a community has changed. Cause and effect can only be understood when historical sequencing is clear. During the 1970's for example, there was a conscious effort to locate industries in low income areas as part of economic development efforts; thirty years later, these social policies intended to address effects of racism have created environmental inequities. In addition, historical use of terms, such as "communities of color," and census classifications have changed in major ways. Analysts must take care to understand the meaning of those terms and the data linked to them in historical context.

Finally, Dr. Cutter suggested the greatest issue in understanding "geographical dimensions of environmental inequities" involves understanding the relative hazardousness of different space. A major

challenge for geographers is how to deal with toxicity. Not all emissions are equal. Not all TRI emitters are the same. And so geographers need magnitude estimators, toxicity indicators and spatial indicators. Given the lack of a robust, accepted approach, she cautioned anyone using analyses of environmental inequities to "be skeptical" if you read literature that draws conclusions about relative geographic toxicities.

In conclusion, Dr. Cutter emphasized the challenges facing any analyst conducting geographic analyses. In her view, policy makers need to be aware of these issues. And finally, she stated, that public concern about environmental inequities may be as important to environmental decision making as any analytical finding that may or may not be made.

The two Co-chairs of the Agency's "National Environmental Justice Mapping Tool Workgroup," Mr. Charles Lee, Deputy Director of the Office of Environmental Justice, and Mr. David Wolf, Manager of Geoservices, Office of Environmental Information, had been invited to provide some brief reflections on Dr. Cutter's presentation.

Mr. Lee opened with some historical observations. In researching his 1987 book *Toxic Waste and Race*, he noted a key study by Dr. Cutter that documented environmental perceptions in Chicago that showed high levels of concerns among different population groups around the environment. In his view, improvements in geospatial analysis have stimulated work on environmental justice. Although geographic tools may be "blunt," they bring important issues into sharper release. EPA's new workgroup is aiming to develop a nationally consistent mapping tool for doing more nationally consistent geographic analyses.

He said that Dr. Cutter's opening remarks and her final conclusions were key. If one did have "proof" of environmental inequity, one must ask "what's the point? what comes next?" Spatial analysis is part of a greater question: what actions need to be taken?

Mr. Wolf then provided his perspective. In his view, EPA's application of Geographic Information Systems (GIS) for environmental justice is one of the most important applications of GIS. The Agency is trying to introduce true geographic analysis, not just mapping. Despite amazing improvements in abilities to process information, however, EPA has not experienced a comparable "huge shift in data quality." Critics can rightly say that GIS may help us "get the wrong conclusion more quickly" if the Agency does not move more quickly to improve the spatial component of its data. He noted that EPA was not alone. Demographic data available from the census data use "old GPS coordinates." In his view, the country's geospatial infrastructure needs continued improvement. He concluded with a reaction to Mr. Lee's question about "what's the point?" of geographic analysis. He asked if the Agency is interested in relating risk and population and "coming to some decision." If that truly is to be part of the environmental justice policy, he stated that it would be "hard to do and something new for the Agency."

Dr. Cutter responded that "connecting the proximity surface to the risk surface is what communities want" and should be the direction for the Agency. She suggested that providing available risk information may work to allay fears in communities about environmental risks. She acknowledged the methodological questions of modeling exposure surfaces and toxicity surfaces.

The broader group also joined the discussion. The first question concerned the issue of uncertainty. If geographical analysis involving risk is so difficult, then is it worth the major investment in such complexity? And if people's concerns are the major issue, what's the point of the more detailed analysis? Dr. Cutter responded that there are practical applications of geographic analyses that she foresees. She saw a potential to develop understandings of geographic areas as "risk sheds" that would allow decision makers to evaluate total risks for an area. Using geographic analysis could help decide how to make decisions about whether to site additional facilities. She also believed that communicating geographic information about differential inequities could have an impact on people's perceptions of risk.

In response to other questions, Dr. Cutter talked about the potential of geographic analyses in helping the Agency make major more holistic decisions that would break down artificial barriers created by media-specific approaches. She discussed the need to develop a multimedia exposure model that could be used in such geographic analysis.

One question related to whether geographers had conducted modeling efforts, where they kept all variables except one parameter constant. Dr. Cutter responded that it has been hard to get funding for such studies involving large geographic data sets, and that the approach described had not been the focus of a consistent targeted research effort. She also saw value in the questioner's suggestion that research should compare simple vs. complex data systems to conduct sensitivity analyses demonstrating the value added by more complex elements.

Finally, in response to a question about the state of current geographical research on transgenerational equity, Dr. Cutter stated that analysis has focused primarily on protecting natural resources, rather than looking at human health resource projections, with all their uncertainties, for future generations.

DR. ROBIN CANTOR

I ISSUES IN THE ECONOMIC APPRAISAL OF ECOLOGICAL VALUE AND DAMAGES

On June 6, 2002, the U.S. Environmental Science Advisory Board (SAB) hosted the fourth lecture in the third year of its series, Science and the Human Side of Environmental Protection. The presenter was Dr. Robin Cantor, a member of the SAB's Research Strategies Advisory Committee and a Principal and Managing Director at LECG, LLC. She spoke on the topic "Issues in the Economic Appraisal of Ecological Value and Damages." Thirty-five people from six Headquarters Offices, four regions (including one invited guest from the New York Academy of Sciences), and one SAB member participated in the audience.

Dr. Cantor introduced her talk by providing a brief background on her work with LECG, an economics consulting firm that provides analyses to private clients, analysis primarily used in litigation. Clients are interested in whether one activity or choice, involving ecological resources is better than another, and are interested in the topic of compensation for injury to resources. She proposed to outline the kinds of data and methods used for these questions; their potential for valuing protection of ecological systems and services by EPA; and their relevance to a planned SAB project on that topic to be discussed later in the lecture and discussion to follow.

From her vantage point, there has been a recent change in the reasons why people are interested in valuing ecological assets and a change in how they are valuing them. As a result, there is increased information that can be used in understanding the values placed on ecological assets. In addition to old reasons [litigation to support Natural Resource Damage (NRD) cases that focused on the dollar value of resources, support for regulatory decisions, and academic curiosity], there are some new reasons. In NRD cases, responsible parties are increasingly willing to settle with trustees and these settlements provide a body of information that can be used. There is also a body of literature emerging from: mitigation banking (e.g., for wetlands); liability transfers (where private entities sell damaged properties from their portfolios and calculate environmental damages into the equation); Supplemental Environmental Projects, where acceptable trades are established for damages; and environmental easements. In her experience, since she joined LECG in 1996, large companies are considering the ecological capabilities of their properties as important as the production component of these properties.

As background for her discussion of the changes in how people now are valuing ecological assets, she discussed some basic principles of economics and how they have applied to the question of measuring economic value of ecological assets. She said that economists feel strongly about markets, because markets reveal individual preferences. Value, in economic terms, is defined by human use and human appreciation of existence. For ecological assets, a key problem is that ecological resources don't have price tags. As a result, there is often frustration between economists and others who believe that values are holistic and intrinsic and not revealed by the market. Frustration also crops up when the convention wisdom about worth (i.e., Anything worth doing is worth doing well) meets the economic commitment to marginal analysis (Anything worth doing is worth doing up to the point where the marginal benefit equals the marginal cost).

Dr. Cantor sketched out the tools that have been used for measuring economic value. They have

measured either revealed sources of economic values (markets); expressed sources (through direct elicitation); or imputed values (avoided costs). She provided a thumbnail sketch of some of the tools that have been used (e.g., survey tools, such as contingent valuation and conjoint analysis; productivity modeling; travel cost models; hedonic price analysis; benefit transfer; and damage cost models).

Dr. Cantor then described in more detail, the changes that have been taking place in why people are interested in valuing ecological assets and how they are valuing them. One major driver of change has been the NRD process, which establishes the value of damaged natural resources removed from public use. At the start of this program, the focus of NRD Trustees, such as the National Oceanic and Atmospheric Administration and the Department of Interior, was on monetary compensation for goods and direct services. Assessment of damages did not include ecosystem services or capabilities. As the NRD process has matured, there has been a shift in the analyses done by Trustees, who now consider the ecological *capabilities* lost as part of the damages to be assessed. They increasingly emphasize restoration, rehabilitation, replacement, or acquiring the equivalent of the damaged resources. Increasingly, the goal of the NRD process is to convince the Trustees that the public is being made whole from a biophysical point of view and that there is an acceptable nexus between the lost resources and compensation. The database generated as a result of these new NRD settlements provides, in her view, a rich source of information to be used in assessing value of ecological assets.

Analytical techniques have also evolved to support this shift in perspective. Habitat Equivalency Analysis and Scaling have accompanied the shift from a use-based theory of value to a resource-based theory of value. A review of how these tools have been used, however, shows that NRD settlements often do not account well for inequalities in ecological capabilities, and also do not account for the different development potential of ecological resources traded or changes in preferences that affect welfare (for example, changes in recreational preferences). Scoring methods have developed to bridge the gap. These methods account for bio-physical attributes, bio-physical functions and production of goods and services, and also accounts for key economic features, such as interdependencies with landscape influences (local market conditions and adjacent conditions); temporal and spacial boundaries; scarcity and substitutability; and uncertainty.

Dr. Cantor saw the private market in ecological assets evolving in parallel. Brokers have emerged to facilitate trades by providing information and expertise on ecological assets and to help to make deals between Potentially Responsible Parties and Trustees. She cited a recent New Jersey study of wetland mitigation and ecological quality as a cautionary note, indicating that a high proportion of ecological asset trades may be occurring at a low cost and quality and she mentioned that public sector involvement might offset this market dynamic, by increasing regulatory pressures that may increase demand.

Dr. Cantor urged the Agency to look at the suite of new empirical data sources that could provide new information and methods for valuation. She recommended that the Agency consider information available about NRD settlements; information from EPA's own Supplemental Environmental Projects (and the trades they deem acceptable for injuries to environmental resources); and the increasing body of information available from businesses that are valuing land for its capabilities to produce ecological goods and services (e.g., valuation for environmental liabilities for converting insurance coverage; valuation associated with easements or donated property, and wetland mitigation banking).

Dr. Cantor suggested that the Science Advisory Board's new project "Valuing the Protection of Ecological Systems and Services" consider the merits of some of these scoring methods; gather and evaluate information on actual trades; consider whether valuation might follow the residential or commercial analogue for establishing valuing (e.g., whether trades can be understood as fairly homogenous, as in the case of residential properties, or whether the characteristics of individual trades involve many complex, distinguishing features that need independent analysis, as generally in the case of commercial properties.)

Dr. Angela Nugent, in EPA's Science Advisory Board Staff, briefly introduced the new SAB project, which is being planned. This multi-year project, endorsed by the SAB Executive Committee at its March 2002 meeting, is entitled "Valuing the Protection of Ecological Systems and Services" and is intended to enhance the tools available for analyzing the value of protecting ecological systems and services and to strengthen the Agency's use of them for decision making. She described how the project was immediately stimulated by the controversy among members of the Advisory Council on Clean Air Compliance Analysis's Panel to Review the Draft Analytical Plan for EPA's Second Prospective Analysis of the Costs and Benefits of the Clean Air Act. In the work of that panel, ecologists and economists disagreed on how to advise the Agency on quantifying the benefits of protecting ecological systems and services as a result of implementing the Clean Air Act. The new project was also linked to the SAB's past interest in strengthening the Agency's tools for ecological protection and analysis of the benefits and value of ecological protection, as described in such SAB reports as *Reducing Risk and Toward Integrated Environmental Decision Making*, SAB's workshop in 2001, *Understanding Public Values and Attitudes Related to Ecological Risk Management: an EPA Workshop Report of an EPA/SAB Workshop*, that focused on the real-life example of valuation issues associated with air deposition of nitrogen in Tampa Bay.

The SAB is seeking a person to chair to lead this new multi-disciplinary effort, which will encompass ecological, economic, social, and technological analyses. SAB staff will be meeting with a coordinating group that will include the National Center for Environmental Economics, the Office of Water and the Office of Air and Radiation. Dr. Nugent welcomed the ideas and participation of others in this effort.

Questions then came from the general audience. The first question came from the SAB member participating by teleconference and concerned whether there were enough data available from wetland trading for conclusive analysis of the value of such trades. Dr. Cantor responded that there were enough transactions, but it was unclear whether there were sufficient data. The states of Florida and New Jersey have been the most systematic in collecting data, and that New Jersey had collected the most biophysical data. Both Dr. Cantor and the questioner agreed that EPA could help further systematize and characterize the data states collected and that EPA and others would benefit from the resulting data set.

A question from a regional participant pertained to whether the SAB project had been engaging EPA's National Center for Environmental Economics (NCEE). Dr. Nugent replied that NCEE was involved and welcomed Region 4's participation in planning, as lead region for the Office of Policy, Economics and Innovation.

Several questions then followed pertaining to the nature and availability of data sets Dr. Cantor had described. In regard to Supplementary Environmental Projects; Dr. Cantor emphasized the potential usefulness of information gathered by EPA in developing Supplementary Environmental Projects; EPA's website suggests a rich source of information. Another question concerned the recent New Jersey study of

wetlands mitigation banking and the low efficiency described for the trades studied. The questioner asked whether this report would have a negative effect on future trades. Dr. Cantor replied that the New Jersey wetlands mitigation program was perceived as a leader and the impact of its recent report is unclear. She suggested that regulatory pressures might increase demand for higher ecological quality trades in the future.

Another set of questions concerned the concept of value. On question referred to the frustration that Dr. Cantor had described as a theme for many past interactions between economists and others on this topic. The questioner pointed out that many believe that market valuation isn't the only element in establishing value. Dr. Cantor agreed and responded that she has used the term economic appraisal, not economic valuation in her talk. The questioner then asked about the scope of the SAB project and whether it would address whether discounting was appropriate for valuation. Dr. Nugent responded that the Board intended to look at a wide range of kinds of environmental decisions and is planning to consider a wide range of tools. It is likely that the Board will focus on identifying where different tools may be most appropriate, and undoubtedly the issue of discounting will arise. Dr. Cantor echoed this view and suggested that the SAB should involve and learn from the climate change program, where there has been controversy over discounting. She also suggested that there were tools used by other social scientists for establishing social, rather than individual preferences that the Agency might benefit from considering.

The final set of questions concerned whether there are international resources that the Agency might use in strengthening its approach to valuing ecological resources. Dr. Cantor identified an Australian website in New South Wales that contained a huge collection of valuation literature that addresses ecological assets and services. She also urged the Agency to review: (1) the resources and discussions undertaken as part of the Intergovernmental Panel on Climate Change (IPCC); (2) the work of England, France and the Netherlands regarding trading programs for carbon dioxide; (3) England's program for granting credits to encourage renewable energy; and (4) information from the World Bank program forgiving debt where environmental investments were made.

APPENDIX C

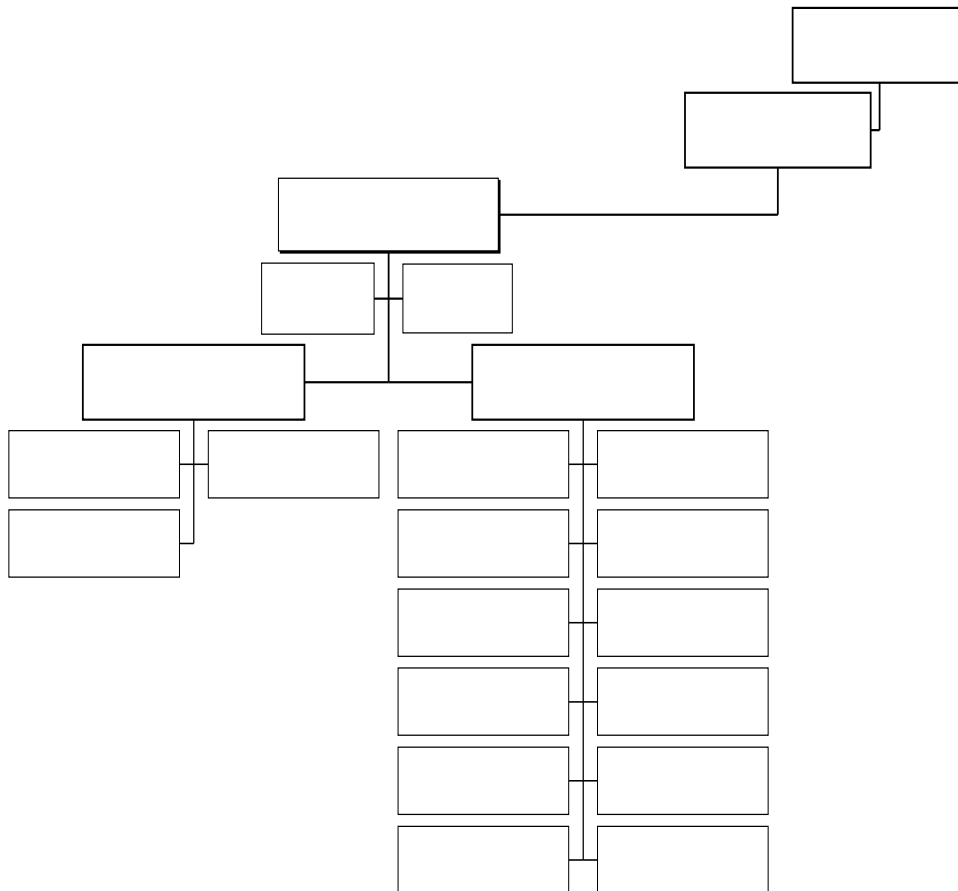
SAB PEOPLE

- C1. Staff Organization Chart
- C2. SAB Committee Chairs
- C3. Guidelines for Service on the SAB
- C4. Types of Affiliation with the SAB
- C5. SAB Members for FY 2002
- C6. SAB Consultations for FY 2002
- C7. Staff Biographical Sketches

C1

SAB STAFF ORGANIZATION CHART

Some of the following positions were filled by two people during the year as changes in personnel or staff alignments were made. On the Staff Committee Alignment chart (next page), where two people occupied a position during the year, both are listed. The first person listed was the incumbent at the close of FY 2002.



C2

SAB COMMITTEE CHAIRS

Executive Committee (EC)

Dr. William Glaze

Professor, Environmental Science and Engineering, University of North Carolina, Chapel Hill

Professor, School of Public Health, University of North Carolina, Chapel Hill

Member, American Chemical Society

Member, National Academies Board of Environmental Science & Toxicology

Member, Board of Directors, Green Chemistry Institute, ACS

Member, Governor's Board of Advisors, NC Museum of Natural Sciences

Editor-in-Chief, Environmental Science and Technology

Advisory Council on Clean Air Compliance Analysis (Council)

Dr. Trudy Cameron

Raymond F. Mikesell Professor of Environmental and Resource Economics, University of Oregon

Professor, University of California, Los Angeles (on leave)

Member, Econometric Society

Member, American Economic Association

Member, American Statistical Association

Member, Association of Environmental Resource Economists

Member, American Agricultural Economics Association

Member, International Society for Ecological Economics

Clean Air Scientific Advisory Committee (CASAC)

Dr. Philip Hopke

Bayard D. Clarkson Distinguished Professor, Departments of Chemical Engineering and Chemistry, and Director of the Center for Air Resources Engineering and Science, Clarkson University

Member, American Association for Aerosol Research, Vice President, 2002-2003,

Vice President Elect, 2001-2002

Member, American Chemical Society and the Division of Nuclear Chemistry and Technology and the Division of Environmental Chemistry

Member, American Physical Society and the Division of Nuclear Physics

Member, Air & Waste Management Association

Member, American Association for the Advancement of Science

Member, International Chemometrics Society

Member, Gesellschaft für Aerosolforschung

Member, International Society of Exposure Assessment

Member, International Society of Indoor Air Quality and Climate

Editor-in-Chief, *Aerosol Science and Technology*

Editorial Board, *Atmospheric Environment*

Member, Advisory Committee, NIEHS funded Program Project Cardiac Vulnerability Related to Particulate Matter at Harvard School of Public Health

Drinking Water Committee (DWC)

Dr. R. Rhodes Trussell

Senior Vice President, MWH, Inc.

Member, American Society of Civil Engineers

Member, Sigma Xi

Member, American Chemical Society

Member, Magazine Editorial Board, ES&T

Member, National Association of Corrosion Engineers

Life Member, American Water Works Association

Member, Water Environment Federation

Member, American Institute of Chemical Engineers

Member, Association Programme Committee

Member, Strategic Council

Member, Editorial Board for Aqua

Member, National Academy of Engineers

Member of NRC Water Science & Technology Board

Member NAE Peer Committee, Section 4

Member, National Research Council Committee Indicators For Waterborne Pathogens

Chair, Industrial Advisory Board, Department of Civil and Environmental Engineering, UCLA

Member, Industrial Advisory Council to the Dean, College of Engineering, UC Riverside

Ecological Processes and Effects Committee (EPEC)

Dr. Terry Young

Senior Consulting Scientist, Environmental Defense Fund, Oakland, CA

Member, Advisory Committee to the University California Salinity/Drainage Program

Expert Testimony for EDF before U.S. House of Representatives Subcommittees, California State Water Resources Control Board, and California Regional Water Quality Control Board

Environmental Economics Advisory Committee (EEAC)

Dr. Robert Stavins

Albert Pratt Professor of Business and Government, and Faculty Chair, Environment and Natural Resources Program, John F. Kennedy School of Government, Harvard University

University Fellow, Resources for the Future

Member, EPA Clean Air Act Advisory Committee

Lead Author, Intergovernmental Panel on Climate Change

Member, Board of Directors, Robert and Renée Belfer Center for Science and International Affairs

Member, Executive Committee, Harvard University Committee on Environment

Member, Board of Academic Advisors, AEI-Brookings Joint Center for Regulatory Studies
Member Editorial Council, The Journal of Environmental Economics and Management
Member, Board of Editors, Resource and Energy Economics
Member, Advisory Board, Environmental Economics Abstracts
Member, Editorial Board, Economic Issues
Contributing Editor, Environment

Environmental Engineering Committee (EEC)

Dr. Domenico Grasso

Chair, Rosemary Bradford Hewlett
Professor, Picker Engineering Program, Smith College
Editor-in-Chief, Environmental Science

Environmental Health Committee (EHC)

Dr. Henry Anderson

Chief Medical Officer and State Environmental and Occupational Health Epidemiologist, Wisconsin
Division of Public Health
Adjunct Professor, Department of Population Health, University Wisconsin Medical School
Certified in Preventive Medicine, American Board of Preventative Medicine
Certified Specialist in Occupational and Environmental Medicine, American Board of Preventative Medicine
Fellow, American College of Epidemiology
Fellow, American Association for Advancement of Science
Member, American Public Health Association
Member, American College of Epidemiology
Member, American Medical Association
Member, American Occupational and Environmental Medicine Association
Member, Council of State and Territorial Epidemiologists
Member, International Society of Environmental Epidemiology
Member, Collegium Ramazzini
Member, Editorial Board, Cancer Prevention International
Associate Editor, American Journal of Industrial Medicine

Integrated Human Exposure Committee (IHEC)

Dr. Ken Sexton

Bond Professor, University of Minnesota
Director, Center for Environment and Health Policy, University of Minnesota
Member, International Society of Exposure Analysis
Member, Society of Risk Analysis
Member, American Chemical Society
Member, American Association for the Advancement of Science

Radiation Advisory Committee (RAC)**Dr. Janet A. Johnson**

Senior Technical Advisor, MFG, Inc.
Member, Fellow, and Past Board Member, Health Physics Society
Past President, Radon Section, Health Physics Society
Member, Colorado Radiation Advisory Committee
Member, American Academy of Health Physics
Member, American Industrial Hygiene Association
Member, American Academy of Industrial Hygiene

Research Strategies Advisory Committee (RSAC)**Dr. Raymond Loehr**

H. M. Alharthy Chair and Professor, Department of Civil Engineering, University of Texas, Austin, TX
Member, National Academy of Engineering
President, American Academy of Environmental Engineers
Licensed Professional Engineer and Certified Environmental Engineer
Chair, EPA NACEPT Superfund Evaluation Subcommittee
Member, Society of Environmental Toxicology and Chemistry
Member, Water Environment Federation
Member, American Society of Civil Engineers
Member, National Research Council Review Committee
Member, Environmental Management Advisory Board, Department of Energy
Member, Environmental Science and Technology Advisory Committee, Los Alamos National Laboratory
Member, Advisory Committee, Hazardous Substance Research Center, Louisiana State University
Member, American Association for the Advancement of Science
Member, Strategic Science Research Review Team, American Chemistry Council
Member, Environmental Technologies Advisory Board, Alcoa
Member, Management Board, The RETEC Group, Inc., Concord, MA

C3

GUIDELINES FOR SERVICE ON THE EPA SCIENCE ADVISORY BOARD

Background

The Science Advisory Board (SAB) was established in 1974 by the Administrator. In 1978 the SAB received a Congressional mandate to serve as an independent source of scientific and engineering advice to the EPA Administrator.

The SAB consists of approximately 100 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 Consultants, who are appointed by the SAB Staff Director after conferring with 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 exceptions are reports from the Clean Air Scientific Advisory Committee and the Advisory Council on Clean Air Compliance Analysis, which are separately chartered Federal Advisory Committees operating within the SAB structure.

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 a paramount consideration. Secondary factors considered include the geographic, ethnic, gender, and academic/private sector balance 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 generally appointed in October 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 one 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 year 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.

Consultants are appointed to provide the necessary expertise for specific issues. Their terms of appointment are for one year, beginning at any time, and are 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 DFOs, EPA staff, staff at the National Academy of Sciences\National Research Council, trade groups, environmental groups, professional organizations, scientific societies, regulated industries, and the informed public.

On occasion, 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, which was designed to increase the representation of these groups on the Board.

Consultants are appointed by the Staff Director following a similar procedure.

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 full Committee or a 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 begins by soliciting ideas about potential members from the Agency staff who are intimately acquainted with the issue and will therefore are often 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 reviews 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.

Frequently, a determining factor for selection is the availability of the individual to participate in the public review. In the case of multiple-meeting reviews, the SAB may 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, Donald Barnes, to determine whether there are any obvious conflicts-of-interest.

Legal conflict-of-interests generally arise in connection with particular party matters (A particular matter is any activity in which an employee participates in an official capacity, where he or other persons have a financial interest, if the direct activity --particular matter-- will have a direct and predictable effect on his own or that person's financial interests.) 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 Committee recommendations for additional research studies. In most such cases, the DFO's work with the Committee 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 Counsel. (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, Members and 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 (see Attached) process (a standard part of all SAB Committee meetings) is a mechanism aimed at resolving the apparent conflicts-of-interest issues. This procedure involves an oral

statement (sometimes Board 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 understand the background from which particular individual's comments spring, so that those comments can be evaluated accordingly.

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

Revised: Oct. 12, 1994

Revised: Nov 12, 1996

ATTACHMENT

ATTACHMENT

GUIDELINES 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 advisory 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 M/C's file, at the time of appointment, OGE Form 450, Confidential Statement of Employment and Financial Interest. This form is a legal requirement and is maintained by the Agency as a confidential document.
- b) Providing M/C's with written material; e.g. copies of the Effect of Special Government Employee Status on Applicability of Criminal Conflict of Interest Statutes and Other Ethics Related Provisions, the Standard of Ethical Conduct Synopsis and Ethics Advisories 97-01 and 96-18.
- 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 M/Cs and the observing public to learn more about the backgrounds that 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.

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.

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.

- 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.

C4

TYPES OF AFFILIATION WITH THE SAB

1. SAB Members

SAB members are technically qualified individuals who are appointed to the Board by the Deputy Administrator for two-year terms. Members participate fully in their review committees, which are generally conducted in a collegial, consensus-building style. Their names appear as members on relevant rosters and generated reports.

Note that SAB reports are formally endorsed by SAB members by action of the Executive Committee.

2. SAB Consultants

SAB Consultants are technically qualified individuals who are appointed to the Board by the SAB Staff Director for one-year terms. Generally, Consultants are appointed in order to augment the expertise for a particular review and/or for mutual exploration of future membership on the Board. Consultants participate fully in their review panels and committees, which are generally conducted in a collegial, consensus-building style. Their names appear as Consultants on relevant rosters and generated reports.

3. Federal Experts

The SAB charter precludes Federal employees from being members of the Board. However, in some instances, certain Federal experts have technical knowledge and expertise that can add significant value of the work of the SAB.

In order to access that expertise for the benefit of the Board and the Administrator, the SAB staff will work with the Office of the General Counsel to identify appropriate mechanisms for assessing the potential for conflicts of interest.

The SAB Staff Director can invite Federal experts who do not have a real or apparent conflict-of-interest (either personally or through their agencies) to service on an SAB committee for the duration of a particular the review/study. Federal Experts participate fully on the committees, which are generally conducted in a collegial, consensus-building style. Their names appear as Federal Experts on relevant rosters and generated reports.

4. Invited Expert Resource

In some situations, there are individuals (both Federal employees and non-Federal employees) who have expertise and/or knowledge of data that bears on an SAB review but who also have real or perceived

COIs that would preclude their participation as Members or Consultants. There people can attend the SAB meeting as Invited Expert Resources. The SAB pays travel expenses, if needed.

For example, the person could be the author of a key study of PCBs when the EHC is reviewing the Agency's reference dose for PCBs. The SAB would fund the travel expenses for the person. This person could be either Federal or non-Federal employee. The intent is to have a source real-time, authoritative feedback available during the SAB discussion of the issue. The person would not be asked to serve as a consultant in this case, due to a professional conflict-of-interest; i.e., he would be placed in the position of reviewing his own work.

Another example would be a researcher who has access to some important data, alternative analysis, etc. at another agency, but that is germane to the SAB review. The person would not be asked to serve as a consultant in this case because of a real or apparent conflict-of-interest; e.g., works for an organization (private or Federal) that would be so directly impacted by the Agency's position as to cause a M/C from such an organization to ask for a recusal.

Invited Expert Resources have limited participation in SAB reviews. They are available to answer questions of the SAB committee panel, provide invited presentations, and enlighten the discussion with pertinent pieces of information. Their names are listed as Invited Expert Resources on rosters and reports, with an explanatory footnote recording their presence and role at the meeting. They are not a part of the Board's consensus/decision about the report. The intent is to indicate that such experts were available during the meeting, but that they were not a party to the judgment.

C5

SAB MEMBERS FOR FY 2002

William Adams
Kennecott Utah Copper
Corporation
Magna, UT 84044

Henry Anderson
Wisconsin Division of Public
Health
Madison, WI 53701

Lynn Anspaugh
University of Utah
Salt Lake City, UT 84117

David Baker
Heidelberg College
Tiffin, OH 44883

Steven Bartell
Cadmus Group, Inc
Oak Ridge, TN 37830

Gregory Biddinger
Exxon Mobile Refining and
Supply Company
Fairfax, VA 22037

Bruce Boecker
Lovelace Respiratory Research
Institute
Albuquerque, NM 87108

Timothy Buckley
John Hopkins University
Baltimore, MD 21205

Richard Bull
MoBull Consulting
Kennewick, WA 99336

Dallas Burtraw
Resources for the Future
Washington, DC 20036

Gilles Bussod
Science Network
International, Inc.
Santa Fe, NM 87501

Trudy Cameron
University of Oregon
Eugene, OR 97403

Robin Cantor
LECG, LLC
Washington, DC 20006

Lauraine Chestnut
Stratus Consulting, Inc.
Boulder, CO 80306

Kenneth Cummins
Humboldt State University
Arcata, CA 95521

Virginia Dale
Oak Ridge National
Laboratory
Oak Ridge, TN 37831

Mary Davis
West Virginia University
Health Sciences Center
Morgantown, WV 26506

Michael DeBaun
Washington University
School of Medicine
St. Louis, MO 63110

Ricardo DeLeon
Metropolitan Water District
La Verne, CA 91750

H. Barry Dellinger
Louisiana State University
Baton Rouge, LA 70803

John Evans
Harvard University
Boston, MA 02115

Ivan J. Fernandez
University of Maine
Orono, ME 04469

Paul Foster
Apex, NC 27509

Donald Fullerton
University of Texas
Austin, TX 78712

Thomas F. Gesell
Idaho State University
Pocatello, ID 83209

Cynthia Gilmour
The Academy of Natural
Sciences
St. Leonard, MD 20685

William Glaze
University of North Carolina
Chapel Hill, NC 27599

Lawrence Goulder
Stanford University
Stanford, CA 94305

Domenico Grasso
Smith College
Northampton, MA 01063

Sidney Green
Howard University
Washington, DC 20059

Linda Greer
Natural Resources Defense
Council
Washington, DC 20005

Helen Ann Grogan
Cascade Scientific, Inc.
Bend, OR 97701

Annette Guiseppi-Elie
DuPont Engineering
Richmond, VA 23261

Jane Hall
California State University
Fullerton, CA 92834

James Hammitt
Harvard University
Boston, MA 02115

W. Michael Hanemann
University of California
Berkeley, CA 94720

Robert A. Harley
University of California
Berkeley, CA 94720

Barbara Harper
Yakama Indian Nation
West Richland, WA 99353

Dale Hattis
Clark University
Worcester, MA 01610

Charles Hawkins
Utah State University
Logan, UT 84322

Gloria Helfand
University of Michigan
Ann Arbor, MI 48109

Irva Hertz-Picciotto
University of California-Davis
Davis, CA 95616

David Hoel
Medical University of South
Carolina
Charleston, SC 29425

Philip Hopke
Clarkson University
Potsdam, NY 13699

Richard Hornung
University of Cincinnati
Cincinnati, OH 45267

Hilary Inyang
University of North Carolina
at Charlotte
Charlotte, NC 28223

Janet A. Johnson
Shepherd Miller, Inc.
Fort Collins, CO 80525

Lovell Jones
University of Texas
Houston, TX 77030

Paul Joskow
Massachusetts Institute of
Technology
Cambridge, MA 02139

Roger E. Kasperson
Stockholm Environment
Institute
Stockholm, Sweden 06281

Michael Kavanaugh
Malcolm Pirnie, Inc.
Emeryville, CA 94608

Byung Kim
Ford Motor Company
Dearborn, MI 48323

Catherine Kling
Iowa State University
Ames, IA 50011

Charles Kolstad
University of California
Santa Barbara, CA 93106

George Lambert
Robert Wood Johnson
Medical School
Piscataway, NJ 08855

Lester B. Lave
Carnegie Mellon University
Pittsburgh, PA 15213

Grace LeMasters
University of Cincinnati
Cincinnati, OH 45267

Abby Li
Monsanto Company
St. Louis, MO 63167

Paul J. Lioy
UMDNJ- Robert Wood

Johnson Medical School
Piscataway, NJ 08854

Jill Lipoti
New Jersey Department of
Environmental Protection
Trenton, NJ 08625

Raymond C. Loehr
The University of Texas at
Austin
Austin, TX 78712

George W. Lucier
Consultant
Pittsboro, NC 27312

Ulrike Luderer
university of California at
Irvine
Irvine, CA 92612

Randy Maddalena
Lawrence Berkeley National
Laboratory
Berkeley, CA 94720

Alan Maki
Exxon Mobile
Anchorage, AK 99503

John P. Maney
Environmental Measurements
Assessment
Gloucester, MA 01930

Lawrence L. Master
NatureServe
Boston, MA 02111

Genevieve Matanoski
John Hopkins University
Baltimore, MD 21202

Michael J. McFarland
Utah State University
Logan, UT 84322

Lee D. McMullen
Des Moines Water Works
Des Moines, IA 50321

Judith L. Meyer
University of Georgia
Athens, GA 30322

Paulette Middleton
RAND Environment, Inc.
Boulder, CO 80304

Frederick J. Miller
CIIT Centers for Health
Research
Research Triangle, NC 27709

William Mitsch
Ohio State University
Columbus, OH 43210

Christine Moe
Emory University
Atlanta, GA 30322

Maria Morandi
University of Texas-Health
Sciences Center
Houston, TX 77030

M. Granger Morgan
Carnegie Mellon University
Pittsburgh, PA 15213

Michael C. Newman
College of William & Mary
Gloucester Point, VA 23062

Richard Norgaard
University of California at
Berkeley
Berkeley, CA 94720

Rebecca Parkin
George Washington
University
Washington, DC 20037

Charles A. Pittinger
SoBran, Inc.
Cincinnati, OH 45268

Richard L. Poirot
Vermont Agency of Natural
Resources
Waterbury, VT 05671

Stephen Polasky
University of Minnesota
St. Paul, MN 55108

Richard Revesz
New York University
New York, NY 10012

Bruce E. Rittmann
Northwestern University
Evanston, IL 60208

Genevieve Roessler
University of Florida
Elysian, MN 56028

Ken Sexton
University of Minnesota
Minneapolis, MN 55455

Jason Shogren
University of Wyoming
Laramie, WY 82071

Roy Shore
New York University School
of Medicine
New York, NY 10016

Hilary Sigman
Rutgers University
New Brunswick, NJ 08901

C6

SAB CONSULTANTS

Miguel Acevedo
University of North Texas
Denton, TX 76203-5279

E. Eric Adams
Massachusetts Institute of
Technology
Cambridge, MA 02139

Roy Albert
University of Cincinnati
Medical Center
Cincinnati, OH 45267

Richard Albertini
University of Vermont
Burlington, VT 05401

George Alexeeff
California Environmental
Protection Agency
Sacramento, CA 95814

Herbert Allen
University of Delaware
Newark, DE 19716

Lisa Alvarez-Cohen
University of California-
Berkeley
Berkeley, CA 94720

Mary Anderson
University of Wisconsin-
Madison
Madison, WI 53706

Yolanda Anderson
North Carolina Central
University
Durham, NC 27707

Stephen Ayres
Medical College of Virginia
Commonwealth
University
Richmond, VA 23284

Tina Bahadori
Electric Power Research
Institute
Menlo Park, CA 94025

John Bailar
University of Chicago
Chicago, IL 60637

William Bair
Battelle Pacific Northwest
National Laboratory
Richland, WA 99352

Scott Barrett
John Hopkins University
Washington, DC 20036

Michael Beck
University of Georgia
Athens, GA 30602-2152

Barbara Bedford
Cornell University
Ithaca, NY 14853

Mark Benjamin
University of Washington
Seattle, WA 98195-2700

Edgar Berkey
Concurrent Technologies
Corporation
Pittsburgh, PA 15219-1819

L. Mark Berliner
Ohio State University
Columbus, OH 43210

Frances Berry
Florida State University
Tallahassee, FL 32303

Vicki Bier
University of Wisconsin
Madison, WI 53706

William Bishop
Proctor & Gamble
Cincinnati, OH 45253-8707

Nancy Bockstael
University of Maryland
College Park, MD 20742

Donald Boesch
University of Maryland
Cambridge, MD 21613

James Bond
Toxcon
Durham, NC 27713

Susan J. Borghoff
CIIT Centers for Health
Research
Research Triangle, NC 27709

Anne Bostrom
Georgia Institute of
Technologies
Atlanta, GA 30332

Paul Boulos
MWH Soft, Inc.
Broomfield, CO 80021

Dorothy Bowers
Merck & Company, Inc
Whitehouse Station, NJ
08889

Michael Brauer
The University of British
Columbia
Vancouver, BC V6T1Z3

David Brown
North East States for
Coordinated Air Use
Management
Westport, CT 06880

Gardner Brown
University of Washington
Seattle, WA 98195

Linfield Brown
Tufts University
Medford, MA 02155

Stephen Brown
Risks of Radiation
Chemical Compound
(R2C2)
Oakland, CA 94605

Bert Brunekreef
Utrecht University
Utrecht,

Robert Buchsbaum
Massachusetts Audubon
Society
Wenham, MA 01984

A. Sonia Buist
Oregon Health Sciences
University
Portland, OR 97201

Thomas Burke
Johns Hopkins University
Baltimore, MD 21205

Gary Carlson
Purdue University
West Lafayette, IN 47907
Peter Chapman
EVS Environment
Consultants
N Vancouver, BC V7P2R4

Randall J. Charbeneau
University of Texas at Austin
Austin, TX 78712

Caron Chess
Rutgers University
New Brunswick, NJ 08901

Calvin Chien
E. I. DuPont Company
Wilmington, DE 19880

David Chock
Ford Motor Company
Dearborn, MI 48121

Russell Christman
University of North Carolina-
Chapel Hill
Chapel Hill, NC 27514

Richard Clapp
Boston University
Boston, MA 02118

Lenore Clesceri
Rensselaer Polytechnic
Institution
Troy, NY 12181

Roger Cochran
California Environmental
Protection Agency
Sacramento, CA 95812

Theodora E. Colborn
World Wildlife Fund
Washington, DC 20037

Steven Colome
University of California at
Los Angeles
Los Angeles, CA 90095

Timothy J. Considine
Pennsylvania State University
University Park, PA 16802

Richard A. Conway
Environmental Consultant
Charleston, WV 25314

William E. Cooper
Michigan State University
East Lansing, MI 48824

Robert Coppock
Consultant
Falls Church, VA 22046

Deborah Cory-Slechta
University of Rochester
Rochester, NY 14642

Robert Costanza
University of Maryland
Solomons Island, MD 20688

Maureen L. Cropper
The World Bank
Washington, DC 20433

Kenny Crump
ICF Consulting
Ruston, LA 71270

Ronald G. Cummings
Georgia State University
Atlanta, GA 30303

Thomas Dahms
St. Louis University
St. Louis, MO 63110

Michael Daniels
Iowa State University
Ames, IA 50011

George Daston
Proctor & Gamble
Cincinnati, OH 45253

J. Clarence Davies
Resources for the Future
Washington, DC 20036

James Dearing
Michigan State University
East Lansing, MI 48824

Christopher D Elia
University of Albany, State
University of New York
Albany, NY 12222

Richard Denison
Environmental Defence
Boston, MA 02109

Richard Di Giulio
Duke University
Durham, NC 27708

David Diaz-Sanchez
University of California at
Los Angeles
Los Angeles, CA 90095

Kenneth Dickson
University of North Texas
Denton, TX 76203

Kim Dietrich
University of Cincinnati
Cincinnati, OH 45267

Thomas Dietz
George Mason University
Fairfax, VA 22030

Douglas Dockery
Harvard University
Boston, MA 02115

Kenneth Donaldson
Napier University
Edinburgh EH 10 5DT
Scotland

Philip B. Dorn
Equilon Enterprises, LLC
Houston, TX 77082

John Doull
University of Kansas Medical
Center
Kansas City, KS 66160

Michael Dourson
Toxicology Excellence for
Risk Assessment
Cincinnati, OH 45223

Yvonne P. Dragan
Ohio State University
Dublin, OH 43017

Patricia Durbin-Heavey
Lawrence Berkeley National
Laboratory
Berkeley, CA 94720

Mary Durfee
Michigan Technological
University
Houghton, MI 49931

David Dzombak
Carnegie-Mellon University
Pittsburgh, PA 15213

Richard Ediger
The Perkin-Elmer
Corporation
Norwalk, CT 06859

Lutz Edler
German Cancer Research
Center
Heidelberg, Germany
D-69120

Rebecca A. Efroymson
Oak Ridge National
Laboratory
Oak Ridge, TN 37831

John Elston
State of New Jersey
Department of
Environmental Protection
Trenton, NJ 08625

Lois Epstein
Trustees for Alaska
Anchorage, AK 99501

June Fabryka-Martin
Los Alamos National
Laboratory
Los Alamos, NM 87545

Brendlyn Faison
Hampton University
Hampton, VA 23668

Anna Fan-Cheuk
California Environmental
Protection Agency
Oakland, CA 94612

Elaine Faustman
University of Washington
Seattle, WA 98105

Nancy Fiedler
UMDNJ-Robert Wood
Johnson Medical School
Piscataway, NJ 08854

Lawrence Fischer
Michigan State University
East Lansing, MI 48824

Baruch Fischhoff
Carnegie Mellon University
Pittsburgh, PA 15213

Terry Foecke
Materials Productivity, LLC
Richfield, MN 55423

Robert W. Frantz
General Electric Company
Cincinnati, OH 45215

A. Myrick Freeman
Bowdoin College
Brunswick, ME 04011

Nina Bergen French
SKY + Ltd
Napa, CA 94581

H. Christopher Frey
North Carolina State
University
Raleigh, NC 27695

Roger Fujioka
University of Hawaii
Honolulu, HI 96822

John Gallagher
University of Delaware
Lewes, DE 19958

Michael Gallo
UMDNJ-Robert Wood
Johnson Medical School
Piscataway, NJ 08855

Eric Garshick
Harvard Medical School
West Roxbury, MA 02132

Thomas A. Gasiewicz
University of Rochester
Rochester, NY 14642

Kenneth Geiser
University of Massachusetts at
Lowell
Lowell, MA 01854

Thomas J. Gentile
New York State Department
of Environmental
Conservation
Albany, NY 12233

Bradford S. Gentry
Yale University
New Haven, CT 06511

Panos Georgopoulos
UMUNJ-Robert Johnson
Medical School
Piscataway, NJ 08854

Charles P. Gerba
University of Arizona
Tucson, AZ 85721

James Gibson
Dow AgroSciences
Indianapolis, IN 46268

John P. Giesy
Michigan State University
East Lansing, MI 48824

Richard O. Gilbert
Battelle Memorial Institute
Washington, DC 20024

Michael Ginevan
M.E. Ginevan & Associates
Silver Spring, MD 20901

Arthur Gold
University of Rhode Island
Kensington, RI 02881

Bernard Goldstein
University of Pittsburgh
Pittsburgh, PA 15261

Robert A. Goldstein
Electric Power Research
Institute
Palo Alto, CA 94303

Jose A. Gomez-Ibanez
Harvard University
Cambridge, MA 02138

Ricardo Gonzalez-Mendez
University of Puerto Rico
San Juan, PR 00936

Theodore Gordon
Consultant
Vero Beach, FL 32960

Samuel Gorovitz
Syracuse University
Syracuse, NY 13244

John Gowdy
Rensselaer Polytechnic
Institute
Troy, NY 12180

Robert Goyer
Consultant
Chapel Hill, NC 27514

John D. Graham
Harvard University
Boston, MA 02115

Philippe Grandjean
Boston University
Boston, MA 02118

Daniel Greenbaum
Health Effects Institute
Boston, MA 02129

William Greenlee
Chemical Industry Institute of
Toxicology
Research Triangle, NC 27709

Peter Groer
University of Tennessee
Knoxville, TN 37669

Philip Guzelian
University of Colorado
Health Sciences Center
Englewood, CO 80262

George Hallberg
The Cadmus group, Inc.
Watertown, MA 02472

Anna Harding
Oregon State University
Corvallis, OR 97331

Gregory Harrington
University of Wisconsin
Madison, WI 53706

Winston Harrington
Resources for the Future
Washington, DC 20036

Stuart Harris
Confederated Tribes of the
Umatilla Indian Reservation
Pendleton, OR 97801

Keith Harrison
Michigan Environmental
Science Board
Lansing, MI 48933

Rolf Hartung
Consultant
Ann Arbor, MI 48108

Mark A. Harwell
University of Miami
Miami, FL 33149

Robert Hazen
NJ Department of
Environmental Protection
Trenton, NJ 08625

Clark Heath
American Cancer Society
Atlanta, GA 30329

Rogene Henderson
Lovelace Respiratory
Research Institute
Albuquerque, NM 87108

Carol Henry
American Chemistry Council
Arlington, VA 22209

Janet Hering
California Institute of
Technology
Pasadena, CA 91125

F. Owen Hoffman
SENES Oak Ridge, Inc.
Oak Ridge, TN 37830

Thomas Holsen
Clarkson University
Potsdam, NY 13699

Joseph B. Hughes
Rice University
Houston, TX 77005

Shawki Ibrahim
Colorado State University
Fort Collins, Co 80523

Jay S. Jacobson
Boyce Thompson Institute at
Cornell University
Ithaca, NY 14850

Joseph L. Jacobson
Wayne State University
Detroit, MI 48202

James Jahnke
Source Technology Associates
RTP, NC 27709

Sheila Jasanoff
Harvard University
Cambridge, MA 02138

Michael Jayjock
Rohm and Haas Co.
Spring House, PA 19477

Harvey E. Jeffries
University of North Carolina
Chapel Hill, NC 27599

James H. Johnson
Howard University
Washington, DC 20059

Dale Jorgenson
Harvard University
Cambridge, MA 02138

Wayne M. Kachel
Mele Associates
Rockville, MD 20850
Bernd Kahn
Georgia Institute of
Technology
Atlanta, GA 30332

Jeffery Kahn
University of Minnesota
Minneapolis, MN 55455

G. Graham Kalton
Westat
Rockville, MD 20850

Karl Kelsey
Harvard school of Public
Health
Boston, MA 02115

Nancy K. Kim
New York State Department
of Health
Troy, NY 12180

Gordon Kingsley
Georgia Institute of
Technology
Atlanta, GA 30332

Pat Kinney
Columbia University
New York, NY 10032

Curtis Klaassen
University of Kansas Medical
Center
Kansas City, KS 66160

James E. Klaunig
Indiana University
Indianapolis, IN 46202

Michael Klienman
University of California
Irvine, CA 92697

Lynda Knobeloch
Wisconsin department of
Health and family Services
Madison, WI 53703

Debra Knopman
RAND Science and
Technology
Arlington, VA 22202

Maurice Knuckles
Meharry Medical College
Nashville, TN 37208

Jane Q. Koenig
University of Washington
Seattle, WA 98195

Petros Koutrakis
Harvard University
Boston, MA 02115

David K. Kreamer
University of Nevada
Las Vegas, NV 89154

Margaret Kripke
University of Texas
Houston, TX 77030

Alan J. Krupnick
Resources for the Future
Washington, DC 20036

Thomas W. La Point
University of North Texas
Denton, TX 76203

Nan M. Laird
Harvard School of Public
Health
Boston, MA 02115

Guy Lanza
University of Massachusetts
Amherst, MA 01003

Kinley Larntz
University of Minnesota
Scottsdale, AZ 85254

Timothy V. Larson
University of Washington
Seattle, WA 98195

Debra L. Laskin
Rutgers University
Piscataway, NJ 08854

Victor Laties
University of Rochester
Medical Center
Rochester, NY 14642

Brian P. Leaderer
Yale University School of
Medicine
New Haven, CT 06520

Michael Lebowitz
University of Arizona
Tucson, AZ 85724

Allan Legge
Biosphere solutions
Calgary, Alberta T2N1H1

Arik Levinson
Georgetown University
Washington, DC 20057

Robert J. Lewis
Exxon Mobile Biomedical
Sciences, Inc.
Annandale, NJ 08801

Steven C. Lewis
Exxon Mobil Biomedical
Sciences, Inc.
Annandale, NJ 08801

Reid Lifset
Yale University
New Haven, CT 06511

JoAnn S. Lighty
University of Utah
Salt Lake City, UT 84112

Steve Lindberg
Oak Ridge national
Laboratory
Oak Ridge, TN 37831

Morton Lippmann
New York University
Tuxedo, NY 10987

Kai-Shen Lui
California Department of
Health Services
Berkeley, CA 94704

Lawrence D. Longo
Loma Linda University
Loma Linda, CA 92350

John B. Loomis
Colorado State University
Fort Collins, CO 80523

Karl R. Loos
Equilon Enterprises
Houston, TX 77082

Cecil Lue-Hing
Metropolitan Water
Reclamation District
Chicago, IL 60611

Wu-Seng Lung
University of Virginia
Charlottesville, VA 22903

Richard G. Luthy
Stanford University
Stanford, CA 94305

Donald MacKay
University of Toronto
Toronto, Ontario M5S1A4

Douglas E. MacLean
University of North Carolina
Chapel Hill, NC 21250

David W. Major
GeoSyntec Consultants, Inc.
Guelph, Ontario N1G5B2

George Malindzak
Raleigh, NC 27613

Thomas Malone
University of Maryland
Cambridge, MA 21613

Ellen Mangione
Colorado Department of
Public Health
Denver, CO 80246

William Manning
University of Massachusetts
Amherst, MA 01003

James Martin
University of Michigan
Ann Arbor, MI 48109

Melanie Marty
California Environmental
Protection Agency
Oakland, CA 94612

Joe Mauderly
Lovelace Respiratory
Research Institute
Albuquerque, NM 87108

Karen McBee
Oklahoma State University
Stillwater, OK 74078

Michael McClain
McClain Associates
Randolph, NJ 07869

Roger O. McClellan
Consultant
Albuquerque, NM 87123

Ernest McConnell
ToxPath, Inc.
Raleigh, NC 27613

David E. McCurdy
Duke Engineering and
Services
Marlborough, MA 01752

Leyla McCurdy
National Environmental
Education and Training
Foundation
Washington, DC 20006

Gordon McFeters
Montana State University
Bozeman, MT 59717

Thomas McKone
University of California
Berkeley, CA 94720

Terrence McManus
Intel Corporation
(CHIO-22)
Chandler, AZ 85226

Peter McMurry
University of Minnesota
Minneapolis, MN 55455

Michele Medinsky
Toxcon
Durham, NC 27713

Arend Meijer
GCX, Inc.
Albuquerque, NM 87108

Paul J. Merges
New York State Department
of Environmental
Conservation
Albany, NY 12233

Robert H. Meyer
Keystone Science
Fort Collins, CO 80525

Joseph S. Meyer
University of Wyoming
Laramie, WY 82071

Michael Meyer
Wisconsin Department Of
National Resources
Rhineland, WI 54501

Jana Milford
University of Colorado
Boulder, CO 80309

Nicholas Molina
Pennsylvania Department of
Environmental Protection
Harrisburg, PA 54501

Paul Montagna
University of Texas at Austin
Port Aransas, TX 78373

Peter K. Mueller
TROPOCHEM
Palo Alto, CA 94306

Ishwar Murarka
ISH, Inc.
Sunnyvale, CA 94087

Issam Najm
Water Quality and
Treatment Solutions, Inc.
Chatworth, CA 91311

Bruce A. napier
Pacific Northwest National
Laboratory
Richland, WA 99352

Thomas Natan
Environmental Information
Center
Washington, DC 20036

John S. Neuberger
University of Kansas
Kansas City, KS 66103

Nikolaos P. Nikolaidis
University of Connecticut
Storrs, CT 06269

D. Warner North
North Works, Inc.
Belmont, CA 94002

Charles Noss
Water Environment Research
Foundation
Alexandria, VA 22314

Jerome Nriagu
University of Michigan
Ann Arbor, MI 48109

Gunter Obredorster
University of Rochester
Rochester, NY 14642

Richard T. Okita
Washington State University
Pullman, WA 99164

Adam Olivieri
EOA, Inc.
Oakland, CA 94612

Charles O Melia
Johns Hopkins University
Baltimore, MD 21218

Gilbert Omenn
University of Michigan
Ann Arbor, MI 48109

David M. Ozonoff
Boston University
Boston, MA 02118

Frank L. Parker
Vanderbilt University
Nashville, TN 37235

David K. Parkinson
Long Island Occupational and
Environmental Health
Center
Port Jefferson, NY 11777

Dennis J. Paustenbach
Exponent
Menlo Park, CA 94025

John W. Payne
Duke University
Durham, NC 27708

Marinelle Payton
Harvard Medical School
Boston, MA 02115

William S. Pease
University of California-
Berkeley
Berkeley, CA 94720

James Peeler
Emission Monitoring Inc.
Raleigh, NC 27612

Edo D. Pellizzari
Research Triangle Institute
Research Triangle, NC 27709

Gary H. Perdew
Penn State University
University Park, PA 16802

Frederica Perera
Columbia University
New York, NY 10032

Richard Perritt
University of Southern Maine
Gorham, ME 04038

Barbara J. Petersen
Novigen Sciences, Inc.
Washington, DC 20036

Leif E. Peterson
Baylor College of Medicine
Houston, TX 77030

Richard Peterson
University of Wisconsin
Madison, WI 53705

Robert Pfahl
Motorola Advanced
Technology Center
Schaumburg, IL 60196

Donald Pierce
Oregon State University
Corvallis, OR 97331

Henry C. Pitot
University of Wisconsin
Madison, WI 53706

Daniel Podkulski
Exxon Mobile Chemical
Baytown, TX 77522

Frederick Pohland
University of Pittsburgh
Pittsburgh, PA 15261

Robert B. Pojasek
Pojasek & Associates
East Arlington, MA 02474

John Poston
Texas A&M University
College Station, TX 77843

Joel Pounds
Wayne State University
Detroit, MI 48201

Alison G. Power
Cornell University
Ithaca, NY 14853

Shankar Prasad
California Air Resources
Board
Sacramento, CA 95814

Kimberly Prather
University of California-San
Diego
La Jolla, CA 92093

Lynne Preslo
Earth Tech
Long Beach, CA 90815

James Price
Texas Natural Resource
Conservation Commission
Austin, TX 78711

Leslie A. Real
Emory University
Atlanta, GA 30322

Robert Repetto
Stratus Consulting, Inc.
Boulder, CO 80306

Kenneth R. Reuhl
Rutgers University
Piscataway, NJ 08854

Hanadi S. Rifai
University of Houston
Houston, TX 77204

Knut Ringen
Stoneturn Consultants
Seattle, WA 98166

Paul G. Risser
Oregon State University
Corvallis, OR 97331

James R. Rocco
Sage Risk Solutions LLC
Aurora, OH 44202

Howard Rockette
University of Pittsburgh
Pittsburgh, PA 15261

Everett Rogers
University of New Mexico
Albuquerque, NM 87131

Joan B. Rose
University of South Florida
St. Petersburg, FL 33701

John Rosen
Children's Hospital at
Montefiore
Bronx, NY 10467

Benjamin Ross
Disposal Safety Inc.
Washington, DC 20006

Robert D. Rowe
Stratus Consulting, Inc.
Boulder, CO 80306

Clifford S. Russell
Vanderbilt University
Nashville, TN 37212

Milton Russell
University of Tennessee
Knoxville, TN 37996

Louise Ryan
Harvard School of Public
Health
Boston, MA 02115

Stephen H. Safe
Texas A&M University
College Station, TX 77843

Jonathan M. Samet
John Hopkins University
Baltimore, MD 21205

David A. Savitz
University of North Carolina
Chapel Hill, NC 27599

Robert Sawyer
University of California
Berkeley, CA 94720

Rita C. Schenck
Institute for Environmental
Research and Education
Vashon, WA 98070

Richard Schlesinger
New York University
Tuxedo, NY 10987

William Schull
University of Texas
Houston, TX 10987

Bobby R. Scott
Lovelace Respiratory
Research Institute
Albuquerque, NM 87108

W. Randall Seeker
General Electric Energy and
Environmental Research
Corp.
Irvine, CA 92618

Kathleen Segerson
University of Connecticut
Storrs, CT 06269

Christian Seigneur
Atmospheric and
Environmental Research,
Inc.
San Ramon, CA 94583

Margaret Shannon
State University of New
York
Buffalo, NY 14226

Carl Shy
University of North Carolina
at Chapel Hill
Chapel Hill, NC 27599

Ellen Silbergeld
John Hopkins University
Baltimore, MD 21205

Warren Sinclair
National Council on
Radiation Protection
Bethesda, MD 20814

Sim Sitkin
Duke University
Durham, NC 27708

Mitchell Small
Carnegie Mellon University
Pittsburgh, PA 15213

Gina Solomon
Natural Resources Defense
Council
San Francisco, CA 94105

Anne Spacie
Purdue University
West Lafayette, IN 47907

John D. Spengler
Harvard University
Boston, MA 02115

Douglas Splitstone
Splitstone and Associate
Murrysville, PA 15668

Laura Steinberg
Tulane University
New Orleans, LA 70118

Jan Stolwijk
Yale University
New Haven, CT 06520

Keith Stolzenbach
University of California
Los Angeles, CA 90095

Judy Stout
Marine Environmental
Sciences Consortium
Dauphin Island, AL 36528

Makram Suidan
University of Cincinnati
Cincinnati, OH 45221

James A. Swenberg
University of North Carolina
Chapel Hill, NC 27599

Frieda B. Taub
University of Washington
Seattle, WA 98195

Mary Jane Teta
Exponent Inc.
Southbury, CT 06488

James M. Tiedje
Michigan State University
East Lansing, MI 48824

Thomas Tietenberg
Colby College
Waterville, ME 04901

Michael Toman
Resources for the Future
Washington, DC 20036

Bruce Tonn
University of Tennessee
Knoxville, TN 37996

Nga L. Tran
Exponent/ AKA Novigen
Sciences
Washington, DC 20036

Michael Trehy
Solutia, Inc.
St. Louis, MO 63166

Michael G. Trulear
ChemTreat, Inc.
Richmond, VA 23261

Arthur C. Upton
UMDNJ-Robert Wood
Johnson Medical School
New Brunswick, NJ 08901

Jane Valentine
University of California at
Los Angeles
Los Angeles, CA 90095

W. Kip Viscusi
Harvard Law School
Cambridge, MA 02138

Ian von Lindern
TerraGraphics Environmental
Engineering
Moscow, ID 83843

Herb C. Ward
Rice University
Houston, TX 77005

Judith S. Weis
Rutgers University
Newark, NJ 07102

Bernard Weiss
University of Rochester
Medical Center
Rochester, NY 14642

Christopher G. Whipple
ENVIRON
Emeryville, CA 94608

Ronald White
National Osteoporosis
Foundation
Washington, DC 20037

Warren H. White
Washington University
St. Louis, MO 63130

Robin Whyatt
Columbia University
New York, NY 10027

Chris Wiant
Caring for Colorado
Foundation
Denver, CO 80222

C7

**BIOGRAPHICAL SKETCHES
OF
THE EPA SCIENCE ADVISORY BOARD STAFF**

DR. DONALD G. BARNES
STAFF DIRECTOR
DESIGNATED FEDERAL OFFICER,
EXECUTIVE COMMITTEE

DR. DONALD G. BARNES assumed his position as Staff Director in 1988. Since arriving, he has overseen a 25% growth in the Committees of the Board and a 50% increase in the membership of the Board. During his tenure the Board has completed four major de novo reports [Future Risk (1988), Reducing Risk (1990), Beyond the Horizon (1995), and Integrated Decisionmaking (1999)] and two self-studies (1989 and 1994), in addition to more than 300 reports to the Administrator.

Dr. Barnes is active in Agency-wide issues associated with science and risk assessment. For example, he serves on the Administrator's Science Policy Council and on the Steering committee for the Council.

Dr. Barnes came to the SAB following 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, the implementation of Section 5 of TSCA, and "dioxin", for which he received two EPA Gold Medals for Superior Service.

He has been active in the area of risk assessment for nearly two decades 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 guide-lines; e.g., for cancer and for mixtures. In a tangential activity he has worked with the government of Bulgaria to inculcate risk-based decision making in their emerging environmental protection program, both at the ministry and regional levels. He is on the editorial staff of a peer-review journal and serves as a reviewer for a second risk-related journal.

Prior to coming to EPA, Dr. Barnes was Associate Professor and Science Division Chair at St. Andrews Presbyterian College in North Carolina. 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, their two sons (and wives), and three grandsons.

DR. JOHN R. JACK FOWLE III
DEPUTY STAFF DIRECTOR
DESIGNATED FEDERAL OFFICER,
RESEARCH STRATEGIES ADVISORY COMMITTEE

DR. JACK FOWLE joined the staff as Deputy Director in September 1995. In addition to duties with the SAB staff, Dr. Fowle is interested in the use of science to inform policy and works with the Agency's Science Policy Council, cochairing efforts to implement EPA's Risk Characterization Policy. He is also a member of the Agency's Risk Assessment Forum (RAF), and he chairs the Public Policy Committee for the Society for Risk Analysis.

Dr. Fowle was detailed from EPA to the U.S. Senate as Senator Daniel Patrick Moynihan's Science Advisor from January 1992 until December 1994. While focusing on environmental legislation, he provided advice to the Senator and to the Senate Committee on Environment and Public Works on a wide range of issues. He was the principal staff person working on Senator Moynihan's risk bills in the 102nd and 103rd Congresses.

Before joining Senator Moynihan's staff, Dr. Fowle spent three years in Research Triangle Park, NC as Associate Director of EPA's Health Effects Research Laboratory. He planned and managed EPA's Drinking Water Health Research Program, and coordinated EPA's R&D work efforts with the World Health Organization.

Dr. Fowle first came to EPA in 1979 when he joined ORD's Carcinogen Assessment Group, and has served in a variety of other capacities since then. He managed the development of EPA's initial Biotechnology Research Program in 1983 and 1984 and was subsequently detailed to Congressman Gore's Investigation and Oversight Subcommittee, Committee on Science and Technology, as a Science Advisor on Biotechnology issues. He directed the Environmental Health Research staff of the Office of Health Research in ORD at EPA headquarters from 1985 to 1987, and was Health Advisor to EPA's Assistant Administrator for Research & Development in 1988 and 1989, and in 1995.

Dr. Fowle received both his baccalaureate and doctoral degrees in genetics from George Washington University in Washington, DC.

Dr. Fowle, a resident of Washington, DC, is an amateur musician. As a member of the BOOGAG (Bunch of Old Guys and Gals) bicycle riding club puts in 40 to 60 miles each weekend climbing the hills of western Maryland, northern Virginia and southern Pennsylvania. It's not a ride unless you climb over 1800 feet.

DR. ANGELA NUGENT
SPECIAL ASSISTANT TO THE STAFF DIRECTOR
DESIGNATED FEDERAL OFFICER,
ADVISORY COUNCIL ON CLEAN AIR COMPLIANCE ANALYSIS

DR. ANGELA NUGENT is a historian who has found work at EPA as interesting as combing the archives for the history of public health, science and technology. Angela serves as the DFO for the Council and its two subcommittees and for several ad-hoc panels of the SAB Executive Committee. She also serves as Special Assistant to the Staff Director.

Angela holds a Ph.D. (1982) and M.A. (1976) from Brown University, where her research focused on the history of industrial toxicology. She received a B.S.F.S. degree from Georgetown University's School of Foreign Service in 1974.

Angela is married to Bruce Odessey, a writer-editor for the U.S. Department of State. She enjoys most of all spending time with him and their seven-year old daughter, Rachel. Together, they like to dance, sing, travel, and read.

MR. A. ROBERT FLAAK
ACTING DEPUTY STAFF DIRECTOR
DESIGNATED FEDERAL OFFICER,
EXECUTIVE COMMITTEE

MR. A. ROBERT FLAAK serves as the Acting Deputy Director of the SAB, Team Leader of the SAB Committee Operations Staff, and as Designated Federal Official for the Clean Air Scientific Advisory Committee (CASAC). Mr. Flaak was first associated with the Science Advisory Board (SAB) in 1978 when he became the DFO for the Clean Air Scientific Advisory Committee (CASAC) when the committee was first chartered. Since then he has been the DFO for the following SAB committees: CASAC (1978-1979; 1984-1991; 1995-2002); Indoor Air Quality/Total Human Exposure Committee (now the Integrated Human Exposure Committee) (1986-1993); Drinking Water Committee (1991-1993; 1995); ad hoc Industrial Excess Landfill (IEL) Panel (1992-95); Environmental Futures Committee (1993-1995); Research Strategies Advisory Committee (1995-1998), and a host of SAB subcommittees and working groups involved with issues such as global climate, biotechnology, and reducing risk. Mr. Flaak has also served in several other SAB management positions including Acting Staff Director, and Assistant Staff Director.

In addition to his duties with the Board, Mr. Flaak has continued his part-time detail to the Agency's Science Policy Council (SPC) as a member of the Agency's Peer Review Advisory Group, and has become a Member of the SPC Steering Committee. Since 1988, Mr. Flaak has assisted the General Services Administration (GSA) in the development and presentation of its National training course on Federal Advisory Committee Act (FACA) Management. During the past year he has worked with GSA on the implementation of the revised regulations on Federal Advisory Committee Management, and on performance measures for Federal advisory committees.

Mr. Flaak's academic training is in biological oceanography, especially phytoplankton dynamics and bivalve maraculture. He graduated from the City College of New York (BS, Liberal Arts - Concentration in Zoology); the University of Delaware's Graduate College of Marine Studies (MS, Marine Studies - Concentration in Biology and Chemistry); and Central Michigan University's Institute for Professional and Career Development (MA, Management and Supervision -- Concentration in Public Administration). Mr. Flaak lives in Clifton, Virginia with his wife Dottie and their son Christopher.

DR. K. JACK KOOYOOMJIAN
DESIGNATED FEDERAL OFFICER,
RADIATION ADVISORY COMMITTEE , SCIENTIFIC TECHNOLOGY AND ACHIEVEMENT
AWARDS COMMITTEE, MODELING
AND OTHER SAB EC AD HOC ACTIVITIES

DR. JACK KOOYOOMJIAN joined the Science Advisory Board (SAB) in July, 1988. He has served as Designated Federal Official (DFO) for a number of standing committees and panels, such as the Environmental Engineering Committee (EEC; 1988 through 1993), the Radiation Advisory Committee (RAC; 1993 through 2000 and January, 2002 to the present), the Advisory Council on Clean Air Compliance Analysis (Council; January 1994 through March of 1999), as well as the Council's subcommittees. He currently is DFO for the RAC and various Ad Hoc Panels of the SAB's Executive Committee (e.g., NATA Review Panel, UST/RCRA Benefits, Costs and Impacts Review Panel, 3MRA Review Panel, and CREM), and assists with the STAA Committee. He brings to the SAB over 35 years of engineering and professional experience, including over 28 years of diverse experience within EPA Headquarters.

Prior to joining the SAB, Jack worked in the Office of Solid Waste (OSW; 1974 - 1976), the Office of Water's Effluent Guidelines Division (1976 - 1979), and Agency's Office of Solid Waste and Emergency Response (OSWER; 1979 - 1988) where he was responsible for developing the multi-media hazardous substance reportable quantity regulations, oil and hazardous substance pollution prevention regulations, oil spill reporting requirements, as well as the oil and dispersant testing and registration program under 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. He is professionally active in the Water Environment Federation's (WEF) local Member Association, the Federal Water Quality Association (FWQA). He received the Arthur Sidney Bedell Award from WEF for extraordinary personal service in the water pollution control field. He has served in numerous capacities in the FWQA, including President, and "Ambassador-at-Large." He is currently Chairman of the Government Affairs Committee of the FWQA. He is listed in "Who's Who in Science and Engineering," and "Who's Who in the Eastern United States." He is also active in Armenian scientific and engineering circles, and currently serves since 1997 as Chairman of the Organizing Committee of the Greater Metropolitan Washington Area Section (GMWAS) of the Armenian Engineers and Scientists of America (AESA).

Closer to home, which he shares with his wife (Gerry) of 29 years, and Melissa (23), one of their three daughters, Dr. Kooyoomjian is involved in numerous civic activities which focus on development, land-use and environmental issues in his area. He has received the EPA Public Service Recognition Award in 1988 and 1992 and several County Recognition Awards, and in 1995 a Virginia State Planning Association award for his civic involvement. In addition to his civic activities, since 1996 he has been serving on the Board of Directors of the Prince William County Service Authority.

MR. THOMAS MILLER
DESIGNATED FEDERAL OFFICER,
ENVIRONMENTAL ECONOMICS ADVISORY COMMITTEE;
RESEARCH STRATEGIES ADVISORY COMMITTEE

MR. TOM MILLER joined the Science Advisory Board (SAB) in June, 1996 as Designated Federal Official (DFO) for the Drinking Water Committee (DWC) and the Environmental Economics Advisory Committee (EEAC). Tom has worked at the Environmental Protection Agency in regulatory (pesticides, toxic substances), budget, and planning activities (research and development programs) since 1974.

Mr. Miller received a BS (Wildlife Management) in 1972 and an MS (Wildlife Management) in 1975, both from West Virginia University. For his Master's research, Mr. Miller conducted a radio-telemetry study of black bear habitat utilization in the Monongahela National Forest of West Virginia. In 1993, Tom received a Masters of Public Policy from the University of Maryland School of Public Affairs. Tom's major professional interest is the study of the ways that science and policy development interact to identify and implement appropriate approaches to environmental management, and the role of citizens in decisions leading to the selection of management approaches.

Tom is married and is the father of one daughter, Stephanie, and one son, Christopher, (who is a University Junior). Tom is involved with leadership positions in his church, and he enjoys flyfishing, skating, cross-country skiing, backpacking, and woodworking.

MR. SAMUEL RONDBERG
DESIGNATED FEDERAL OFFICER,
ENVIRONMENTAL HEALTH COMMITTEE;
INTEGRATED HUMAN EXPOSURE COMMITTEE

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

Before joining EPA in 1974, Mr. Rondberg held research management, analytical, and policy formulation positions with the Department of Transportation and the Veterans Administration's Department of Medicine and 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's wife (Ruth) of 36 years is a Rehabilitation Counselor; they have one daughter, who completed a Master's degree in Social Work. Sam 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 posters and advertising graphics as a reflection of our social history.

MS. STEPHANIE SANZONE
DESIGNATED FEDERAL OFFICER,
ECOLOGICAL PROCESSES AND EFFECTS COMMITTEE

MS. STEPHANIE SANZONE has been a Designated Federal Officer at the EPA Science Advisory Board for 9 years, working primarily with the Ecological Processes and Effects Committee. 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. Prior to coming to SAB, she spent 4 years with EPA's National Estuary Program, a program which assists states and local communities to manage and protect bays and estuaries based on sound science. Ms. Sanzone has also worked to bring science to the legislative process, serving as legislative staff at both the state and federal levels. Her professional interests include ecological sciences, the role of science and risk assessment in policy making, and making science and scientists intelligible to lay audiences (e.g., policy makers, managers and the public).

MS. KATHLEEN WHITE
DESIGNATED FEDERAL OFFICER,
ENVIRONMENTAL ENGINEERING COMMITTEE (EEC)

MS. KATHLEEN WHITE 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. Her work as sanitary engineer ___ first for the Massachusetts Department of Public Health and later for U.S. Environmental Protection Agency's Region I ___ involved inspecting and trouble shooting problems with water supplies, landfills, and wastewater treatment plants. She also reviewed plans, assisted with outbreak investigations, proposed and provided training. During this time she chaired the Boston Section of the Society of Women Engineers.

Ms. White left field work in New England for paper work at EPA Headquarters in Washington, D.C. Her subsequent service as acting Director for two divisions in the Office of Health Research led 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. After returning to EPA, she joined the Science Advisory Board staff as Deputy Director.

In 1989, after deciding to work less and enjoy life more, she resigned as Deputy, continuing to work part_time as a Designated Federal Officer. In September 2002 she returned to work full-time. She has supported the Environmental Engineering Committee as DFO since 1993. She is a visual arts volunteer for Arlington County where she lives with her two younger sons, geriatric rabbit and temperamental chow. Her eldest son is a student at Evergreen State College in Olympia, Washington.

MS. DOROTHY MAXINE CLARK
MANAGEMENT ASSISTANT

MS. DOROTHY CLARK is the Management Assistant who assists Samuel Rondberg with the Environmental Health Committee, Integrated Human Exposure Committee and Radiation Advisory Committee, with Jack Fowle the Research Strategies Advisory Committee and Robert Flaak, the Clean Air Scientific Advisory Committee. Dorothy joined the EPA Science Advisory Board (SAB) March 17, 1980, as a secretary for the Environmental Engineering Committee, High Level Radioactive Level Subcommittee and several other Subcommittees and standing Committees. During her tenure at EPA, Dorothy has worked for several SAB Committees. She enjoys working with committee members and getting along with all levels of staff.

Last but not least, in Dorothy s spare time she enjoys reading, shopping, and most of all watching the Washington Redskins play football.

MS. WANDA R. FIELDS
MANAGEMENT ASSISTANT

MS. WANDA R. FIELDS is the Management Assistant who assists Mr. Thomas Miller with the Environmental Economics Advisory Committee and the Drinking Water Committee as well as Dr. John R. Fowle with the Research Strategies Advisory Committee. Wanda joined the EPA Science Advisory Board in the spring of 1997 as a secretary for the Ecological Processes and Effects Committee and the Integrated Risk Project Steering Committee where she assisted Ms. Stephanie Sanzone. In 1998, her title changed to management assistant. Prior to joining us she was a secretary with the Office of Water for nine years here at the Environmental Protection Agency. During her tour with the Office of Water, she took a tremendous amount of computer and administrative training. In 1997 she graduated with honors from a career enhancement program that was offered by EPA. She is currently attending classes at the United States Department of Agriculture to receive a certification in financial management. She hopes to one day obtain a career in finance as a Budget Analyst. She came to EPA in 1988 after leaving the Office of Personnel Management where her government career began.

MS. RHONDA S. FORTSON
MANAGEMENT ASSISTANT

MS. RHONDA S. FORTSON joined the EPA Science Advisory Board (SAB) in 2001. She is the Management Assistant for Mr. A. Robert Flaak on the Clean Air Scientific Advisory Committee (CASAC) and Dr. Angela Nugent on the Advisory Council on Clean Air Compliance Analysis (COUNCIL). Prior to coming to the SAB she was a secretary for 9 years in the Environmental Protection Agency's Region 4 laboratory in Athens, GA. Before joining EPA she held various positions with the Department of Navy.

A native of Virginia, Rhonda was glad to return with her family to her home town this year. She enjoys spending time with her family, working on family genealogy and reading.

MS. MARY WINSTON
MANAGEMENT ASSISTANT

MS. MARY L. WINSTON joined the Science Advisory Board (SAB) in 1988. Prior to joining us she worked in the Test Rules and Development Branch here at the Environmental Protection Agency. Mary came to the Environmental Protection Agency after leaving the U.S. Coast Guard where she worked for 14 years as a secretary. In May of 1998 her title changed from secretary to Management Assistant. Before the reorganization she worked with Samuel Rondberg on the Environmental Health Committee and with Thomas Miller on the Drinking Water Committee. Mary now assists Kathleen Conway with the Environmental Engineering Committee (EEC), also Stephanie Sanzone with the Ecological Processes and Effects Committee (EPEC), and A. Robert Flaak with the Scientific & Technological Achievement Award (STAA) Nominations.

Mary resides in Maryland where she enjoys quilt making, reading and knitting.

MS. BETTY FORTUNE
OFFICE ASSISTANT

MS. BETTY B. FORTUNE joined the Science Advisory Board in September 1993. Her job title is Office Assistant in the Director's Office. She works closely with the Director, Program Specialist and the Executive Committee. During her years with SAB, and several administrative changes, she has worked for the entire staff and with other SAB committees. Betty came to SAB after completing a long tenure with the District of Columbia Public Schools (DCPS). She was the administrative assistant at Hardy Middle School during the final years of her employment in DCPS. She had always worked in the field of Education and has many pleasant memories of her work years with staff, parents, and students. She has received many plaques, awards, and certificates. She is a member of the Senior Choir at her church which performs excerpts from the Messiah during the Christmas season. She lives in DC and her family consists of two children and four grand-children which she greatly enjoys.

Ms. PATRICIA L. THOMAS
TEAM LEADER
COMMITTEE EVALUATION AND SUPPORT STAFF

Ms. PATRICIA THOMAS joined the Science Advisory Board in May 1994 as a Management Analyst. Pat came to SAB from the Office of Research and Development where she held several positions. Her EPA career started with the Office of Research and Development (ORD) in 1972, where she started as the secretary to the Assistant Administrator for Research and Development, and ended as a Management Analyst in ORD's Office of Health Research (OHR). While with the OHR, Pat assisted the OHR Director, who was the EPA Chairman for the Protection of Human Subjects, with the review of Human Subject packages before they went sent to the EPA contracts and grants office. In addition, she was the International Travel Coordinator, Freedom of Information Officer, and ADP and PC Site Coordinator. Prior to coming to EPA, Pat worked 4 years with the Department of Health, Education, and Welfare. Pat has 32 years of government service and has received numerous outstanding awards while at EPA, including a Bronze Medal.

Pat has been the Team Leader of the Committee Evaluation and Support Staff (CESS) since 1996. The CESS is the administrative arm of the SAB, responsible for budget, personnel, payroll, web development, and reports management, including the monthly Happenings newsletter, and the SAB Annual Report. While with the SAB she devised several systems to assist the SAB staff in tracking information on SAB Members and Consultants. In addition, she created a system that tracks the budget for the ten SAB FACA committees. She is referred to in SAB as the keeper of the truth.

She spends most of her leisure time traveling.

MS. CAROLYN L. OSBORNE
PROJECT COORDINATOR

MS. CAROLYN OSBORNE joined the Science Advisory Board (SAB) in 1973 as a Clerk typist and has held several positions since then. She was assigned to the Clean Air Scientific Advisory Committee and various subcommittees working closely with the Executive Secretary as a Staff Secretary. Her government career started at the Department of Health, Education, and Welfare and also with the Food and Drug Administration in 1969. Ms. Osborne is currently the Project Coordinator at the SAB's Committee Evaluation and Support Staff where she is responsible for the budgeting, personnel and administrative matters for more than 450 members and consultants. During Carolyn's tenure at the EPA, she has enjoyed working with the SAB staff, members and consultants and is often referred to as the SAB Historian.

In Carolyn's past time she enjoys singing in the church choir, reading, traveling and spending time with her family.

MS. VICKIE J. RICHARDSON
MANAGEMENT ANALYST

MS. VICKIE J. RICHARDSON joined the Science Advisory Board in May 1994 as an Administrative Clerk to the Committee Evaluation Support Staff (CESS). She has since been promoted to Management Analyst where she performs multifaceted administrative and technical tasks for the Board. You may be familiar with some her works, *Happenings* newsletter and the SAB Annual Staff Report. She began her federal career in 1993 with the Department of Defense working for the Air Force Base Conversion Agency, a department that was responsible for closing sparsely populated military facilities throughout the United States. Outside the workplace Vickie believes in giving back to the community. She volunteers in Everybody Wins an organization that provides mentoring and tutoring opportunities to underprivileged children in depressed areas in the District of Columbia.

Ms. Richardson received a B.A. in Speech Communications with a minor in Political Science from Old Dominion University, and a Master in Public Administration from the George Washington University.

She resides in Maryland where she enjoys reading fictional materials to escape the realities of life.

MS. PRISCILLA Y. TILLERY-GADSON
INFORMATION MANAGEMENT SPECIALIST

PRISCILLA Y. TILLERY-GADSON joined the Science Advisory Board (SAB) as the Staff Secretary to the Director in March 1993. She participated in and completed the EPA's Goalsetters Reaching for Opportunities (GRO) Program in 1996. In August 1998, she was reassigned and promoted as a Program Specialist, and in May 2000, she has since been reassigned as an Information Management Specialist on the Committee Evaluation and Support Staff (CESS) providing administrative and technical support to the Director, Deputy Director, and the Team Leader for CESS.

Ms. Tillery-Gadson came to us from EPA's Office of Research and Development (ORD), Office of Health Research (OHR) where she held several positions as Secretary for about 15½ years. She served as OHR International Travel Coordinator and ORD's Headquarters Black Employment Program (BEP) Representative. She also provided updates to the budgetary data in the Office of Research and Development Information System (ORDIS). Prior to working with ORD, she worked with the EPA Office of Pesticides Program (OPP), Registration Division, Insecticide-Rodenticide Branch as a Clerk-Typist and Pesticide Products Clerk for about four years and 10 months. She compiled historical and statistical data for answering inquiries containing scientific data from registrants who applied for registration of their pesticide products.

Prior to coming to EPA, she worked for the U.S. Department of Agriculture for about 1-year under a school/work program. As you can see, Ms. Tillery-Gadson brings a broad range of work experience to SAB, especially the ability to work as a team with her co-workers. She has 30 years of government services, and resides in the Maryland suburbs with her husband and her 28-year-old daughter. She receives a joy in doing for others and has a special love for children.