

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

Roundtable on Science and Technology for Sustainability

May 16-17, 2006 Meeting Participants

PAMELA A. MATSON (NAS) is Naramore Dean of the School of Earth Sciences and Goldman Professor of Environmental Science at Stanford University. Her current research interests include biogeochemical processes in forest and agricultural systems. Dr. Matson was the first to show that geographic variation in biogeochemistry of terrestrial ecosystems controls variation in the production of the important greenhouse gas N₂O. That discovery provided the foundation for her development of global budgets of natural and anthropogenic sources of this and other radiatively significant trace gases. Dr. Matson has served on numerous National Academies' committees, including the Board on Sustainable Development, the Committee on Research and Peer Review in EPA, the Board on Global Change, and others. She is President of the Ecological Society of America, a member of the Aspen Global Change Institute Advisory Board, and a member of the Institute of Ecosystem Studies Advisory Board. Selected publications include Ecosystem Approach for the Development of a Global Nitrous Oxide Budget; Agricultural Intensification and Ecosystem Properties; and Integration of Environmental, Agronomic, and Economic Aspects of Fertilizer Management. Dr. Matson received her B.S. in Biology from the University of Wisconsin – Eau Claire; her M.S. in Environmental Science from Indiana University; and her Ph.D. in Forest Ecology from Oregon State University.

JAMES R. MAHONEY recently retired as the Assistant Secretary of Commerce for Oceans and Atmosphere/Deputy Administrator of the National Oceanic and Atmospheric Administration. His career has involved more than 40 years of continuous focus on environment management and the earth sciences, with an emphasis on the atmospheric, climate, hydrological, and oceanographic areas. He has undertaken diverse responsibilities in academic, corporate, national government, and international settings. Dr. Mahoney co-founded the environmental management company Environmental Research & Technology and served as director of the National Acid Precipitation Assessment Program in the Executive Office of the President. He has worked in more than 50 other nations in several different roles: negotiating and overseeing international joint venture technical companies, representing the U.S. government in specialist exchanges, advising government agencies (particularly in developing nations) on sustainable industry, fishery and agricultural practices, and advising several United Nations and other international agencies. Dr. Mahoney has served on several committees of the National Academy of Science and was co-chairman of the Academy's Board on Atmospheric Science and Climate. He is a Fellow and former president of the 12,000-member American Meteorological Society. He received a B.S. degree in Physics from LeMoyne College – Syracuse, NY and his Ph.D. in meteorology from MIT.

MATHEW ARNOLD is a co-founder of Sustainable Finance Ltd. He assists financial institutions and investors in understanding and managing environmental and social risks, and helps them identify environmentally superior investment opportunities. His current clients include Citigroup, JP Morgan Chase, LaSalle Bank, and the Global Environment Fund, a private equity investment company dedicated to environmental investments. He was Chief Operating Officer at the World Resources Institute, a sustainable development think tank. As COO, he was responsible for 140 employees, a \$20-million budget and a \$45-million endowment. He has served as an advisor on environmental and sustainability strategy for several other multinational corporations including DuPont, where he helped develop the organization's sustainable growth strategy, and BP, where he helped business unit

leaders to align with the company's post-Amoco merger focus on greening the brand. In 1990, he founded the Management Institute for Environment and Business (MEB) to help business schools and corporations integrate environmental issues into business strategy. In 1996, MEB merged with the World Resources Institute. Prior to 1990, he held positions in marketing with IBM, in investment banking with Merrill Lynch Capital Markets, and in business development with Santa Fe Trading, Hong Kong. He is a member of the Board of Directors of Forest Trends, a market maker for ecosystem services. He holds an AB degree in Psychobiology from Harvard College, an MA in International Relations from the Johns Hopkins University, and an MBA from the Harvard Business School.

PATRICK R. ATKINS is the Director of Technology-Energy Innovation and is responsible for Alcoa's environmental policy and global environmental programs. He serves on various lead teams and chairs global advisory committees that provide input to Alcoa's corporate environment, health and safety programs. Dr. Atkins joined Alcoa in Pittsburgh in 1972, after serving as a professor in Environmental Health Engineering at the University of Texas at Austin where he taught engineering, industrial hygiene and ecology courses and directed MS and PhD research projects. He became manager-environmental control at Alcoa in 1973, director-environmental control in 1980, director of environmental affairs in 1991 and to his present position in 1995. He also served as Alcoa's chief environmental engineer from 1982 to 1984. Author of over 50 technical articles and editor of two books, Dr. Atkins is a member of the American Society of Civil Engineers, the National Society of Professional Engineers and the Engineering Society of Western Pennsylvania. He represents Alcoa on the environmental committees of the International Primary Aluminum Institute, the Business Roundtable, National Association of Manufacturers and other national and international groups. In addition, he is a former member of the National Academies' Commission on Geosciences, Environment and Resources. Dr. Atkins is a registered professional engineer in the states of Texas and Pennsylvania and is an adjunct professor at the University of Pittsburgh Graduate School of Public Health, teaching industrial waste treatment technology. Dr. Atkins received a bachelor's degree in civil engineering from the university of Kentucky in 1964 and master of science in environmental engineering from Stanford University a year later. He also earned a doctor of philosophy degree in 1968 from Stanford specializing in environmental engineering.

MICHAEL D. BERTOLUCCI is the President of Interface Research Corporation (IRC), Chairman of the EnviroSense® Consortium, Inc. - a not-for-profit organization concerned with Indoor Air Quality - and Senior Vice President of Interface, Inc., a billion dollar enterprise with over 5000 employees. With manufacturing sites in seven countries, Interface is the world leader in the sale of modular carpet tiles and commercial interior fabrics. The research arm, along with the various divisions' R&D laboratories provides fundamental technology to the overall enterprise. As president, Dr. Bertolucci leads not only this effort but also the parent's mission to become the first name in industrial ecology and to provide new technical solutions for Interface as it strives to reduce its footprint on the environment and to become sustainable. He serves on the boards of several not-for-profit organizations, such as the CEO Coalition to Advance Sustainable Technology (CAST), and the oversight committee of the National Research Council's Division on Earth and Life Studies (DELS). Prior to coming to the IRC, Mike spent six years as Vice President of Technology for Highland Industries, an industrial fabrics company, fifteen years in numerous research and development management posts with the General Electric Plastics Business Group, and four years in chemical research at Union Carbide Chemicals and Plastics. Dr. Bertolucci received his Ph.D. in Physical Chemistry from the California Institute of Technology, and his BS degree in Chemistry from San Jose State.

JOHN CARBERRY is Director of Environmental Technology for the DuPont Company in Wilmington, Delaware where he has been employed since 1965. He is responsible for recommendations on technical programs for DuPont based on an analysis of environmental issues. Since 1989, he has led this technology function in a transition to increasingly emphasize waste prevention and product stewardship while maintaining excellence in treatment. Externally, Mr. Carberry is a past Chair of the standing National Academy Committee on the Destruction of the Non-Stockpile Chemical Weapons, a founding member of the Green Power Market Development Group and of the Vision2020 Steering Committee, and a member of the NAE Committees on; Technologies for Sequestering CO₂, and Metrics for Documenting Progress in Global Change Research. Since 1990, John has served on four other National Academy Committees and has presented 30 lectures on environmental issues at 18 universities, given invited presentations at 63 public conferences worldwide and provided 21 literature interviews, or contributions. He holds a B.ChE. and an M.E. in Chemical Engineering from Cornell University and an MBA from the University of Delaware.

LESLIE CAROTHERS is President of the Environmental Law Institute. ELI is an independent, non-partisan education and research organization working to protect the environment by improving law, policy, and management. She has been a professional environmentalist for over 30 years. Before her election as ELI president in June 2003, she served for 11 years as Vice President, Environment, Health and Safety at United Technologies Corporation (UTC) in Hartford, a diversified manufacturer of products for the aerospace and building systems markets. She also served as Commissioner of the Connecticut Department of Environmental Protection from 1987-1991 and Senior Environmental Counsel for PPG Industries, a manufacturing company in Pittsburgh, from 1982-1987. She began her environmental career with the federal Environmental Protection Agency in the air pollution program in Washington in 1971 and later served as Enforcement Director, Deputy Regional Administrator, and Acting Regional Administrator of EPA's New England Region in Boston. In 1991, she was an adjunct lecturer on environmental regulation at the Yale School of Forestry and Environmental Studies. She is a past member and Chair of the Board of Directors of the Connecticut Audubon Society and the Environmental Law Institute and a past member of the Board of the Nature Conservancy (Connecticut Chapter). She currently serves on the Board of Directors of Strategies for the Global Environment (Pew Center on Global Climate Change). She is a graduate of Smith College and Harvard Law School and also holds a Masters Degree in environmental law from George Washington University.

WILLIAM CLARK (NAS) is the Harvey Brooks Professor of International Science, Public Policy and Human Development at Harvard University's John F. Kennedy School of Government. Trained as an ecologist, his research focuses on the interactions of environment, development and security concerns in international affairs. Clark serves on the scientific advisory committees for the Science and Technology for Sustainability Initiative, the International Human Dimensions Programme on Global Environmental Change and the Potsdam Institute for Climate Impacts Research. He is co-author of Adaptive environmental assessment and management (Wiley, 1978) and Redesigning rural development (Hopkins, 1982); editor of the Carbon dioxide review (Oxford, 1982); and coeditor of Sustainable development of the biosphere (Cambridge, 1986), The earth transformed by human action (Cambridge, 1990), Learning to manage global environmental risks (MIT, 2001), and Environment magazine. He co-chaired the recent study by the US National Research Council on Our Common Journey: A Transition Toward Sustainability. Clark is a member of the US National Academy of Sciences, and a recipient of the MacArthur Prize, the Humboldt Prize, and the Kennedy School's Carballo Award for excellence in teaching.

JAMES P. COLLINS is serving as Director of the Directorate for Biological Sciences at the National Science Foundation. Dr. Collins is also currently Virginia M. Ullman Professor of Natural

History and the Environment in the School of Life Science at Arizona State University. He began his career at ASU as Assistant Professor in the Department of Zoology. From 1989 to 2002 he was Chairman of the Zoology, then Biology Department. In 1983 Dr. Collins was Visiting Professor at Duke University, and served as Director of the Population Biology and Physiological Ecology program at the National Science Foundation (NSF) in 1985-86. He is a Fellow of the American Association for the Advancement of Science (AAAS) and a member of AAAS, Ecological Society of America, Society for the Study of Evolution, American Society of Ichthyologists and Herpetologists, Scientific Research Society of North America (Sigma Xi), American Society of Naturalists, Association for Women in Science, American Institute of Biological Sciences, and the International Society for the History, Philosophy and Social Studies of Biology. Dr. Collins received his B.S. from Manhattan College in 1969 and his Ph.D. from The University of Michigan in 1975.

GREGG COOKE is the former Regional Administrator of Region VI of the U.S. Environmental Protection Agency (EPA). Mr. Cooke was the top ranking EPA official in the area that encompasses Texas, Louisiana, Arkansas, Oklahoma, and New Mexico. Mr. Cooke's experience in establishing partnerships to create environmental progress in Texas and the Southwest has been demonstrated by his successful career at the EPA. Mr. Cooke served as Regional Administrator of EPA Region VI for the past four and one-half years. He was appointed to the post by President Clinton and was the only political appointee in the EPA retained by current President George W. Bush. During his tenure, Mr. Cooke was instrumental in developing clean air plans for both Dallas-Ft. Worth and Houston-Galveston in partnership with the State of Texas. These plans contain innovative provisions that incorporate economic incentives as well as traditional mandatory measures. His clean air plans also included development of an innovative "compact" to facilitate early compliance with EPA's upcoming eight-hour standard for such cities as Austin and San Antonio, Texas. Prior to serving as Regional Administrator, Mr. Cooke practiced environmental law as a partner with a major Texas law firm in Austin. His previous professional positions included service as Chief of the Natural Resource Protection and Energy Division of the Office of the Texas Attorney General. While at the office of the Texas Attorney General, he also served as the State's North American Free Trade Agreement Environmental Liaison and served as the temporary General Counsel for the Border Environmental Corporation Commission in Juarez, Mexico. Mr. Cooke earned a B.A. in History, cum laude, from Baylor in 1977. He earned a Master of Foreign Affairs degree from the University of Virginia in 1979, and received a law degree from Baylor in 1982.

JOHN C. DERNBACH is a Professor of Law at Widener University and the former director of the Pennsylvania Department of Environmental Protection's (DEP) Office of Policy. DEP's Office of Policy identifies key issues, coordinates the development of regulations and policy initiatives, tracks and reviews all proposed rulemakings, and helps to provide long-range direction on a broad range of departmental goals and objectives. From 1981 to 1993, Dernbach held various posts with DEP's precursor, the Department of Environmental Resources, wrapping up his tenure there as director of the Advanced Science and Research Team. Dernbach also has been a professor at Widener University Law School since 1993, teaching classes in environmental law, international environmental law, property and administrative law and conducting seminars on global warming and sustainability. He also has extensive international environmental law experience, serving as a visiting lecturer at the University of Geneva's Graduate Institute of International Studies in Geneva, Switzerland, in 2003; at Macquarie University Law School in Sydney, Australia, in 1999; and at the University of Nairobi Law School in Nairobi, Kenya, in 1996. He is the editor of *Stumbling Toward Sustainability* (Environmental Law Institute, 2002), a comprehensive assessment of U.S. sustainable development efforts over the past decade. Dernbach attended the University of Wisconsin-Eau Claire, graduating summa cum laude and receiving his bachelor's degree in science in 1975.

Dernbach received his juris doctor from the University of Michigan Law School in 1978, graduating cum laude.

SAM DRYDEN is Chief Executive Officer of Emergent Genetics LLC, a global leader in the development and marketing of cotton seed utilizing biotechnology. With over twenty-five years in the agriculture and biotechnology field, he has been an active participant in this field since its inception. He has been involved in the founding, management and direction of companies in fields such as biologically-safe pesticides, transgenic animals, single-isomer agricultural chemical compounds, as well as environmental testing and registration of pesticides. On the public sector side, Sam has over fifteen years experience as a pro-bono advisor regarding food security to various foundations such as the, the Rockefeller, McKnight and Macarthur Foundations in the United States. He began these activities in 1986 by chairing a Rockefeller Brothers Fund initiative studying the impending agricultural technology-gap between developed and developing countries. For the past eight years, Sam served in various capacities with the Consultative Group for International Agricultural Research, including Chair of its Private Sector Committee and as a member of its Executive Council. Sam is a member of the Council on Foreign Relations and served on its Study Group analyzing trade issues between the US and Europe relating to genetically modified foods. Sam has a B.A degree from Emory University.

HANK HABICHT is Chief Executive Officer of the Global Environment & Technology Foundation (GETF), a 501(c)3 not-for-profit corporation that fosters innovation in environmental management and in applications of clean technology that make business and environmental sense. He is also a founding principal of Capital E, LLC, a firm that promotes investment in new energy technology. Prior to joining GETF, Mr. Habicht was Senior Vice President of Safety-Kleen Corporation, a provider of industrial and recycling services to more than 400,000 businesses. He was Deputy Administrator for the U.S. Environmental Protection Agency from 1989 to 1993. Mr. Habicht also served as Assistant Attorney General of the U.S. Department of Justice under the Reagan Administration where he directed the Environment and Natural Resources Division. He serves as a Commissioner for the National Commission on Energy Policy; Chairman of Board of Resolve, Inc.; Director of 3E Company; NREL Advisory Board Member of President's Advisory Committee on Trade Policy and Negotiation; and, Steering Committee of the Energy Future Coalition. He also serves on the Dow Chemical Corporate Environmental Advisory Council, the Princeton Environmental Institute and the National Pollution Prevention Roundtable Advisory Boards. Mr. Habicht holds a J.D. from the University of Virginia and an A.B. (magna cum laude) from Princeton University.

JEREMY HARRIS recently completed his second and final term as Mayor of the City and County of Honolulu, Hawaii. As a trained environmentalist, Mayor Harris deeply appreciates the effects that government policy has on the world's eco-systems. Under his direction, the City and County of Honolulu has made great advances in curtailing urban sprawl, while preserving open space and prime agricultural lands. He has initiated numerous educational and volunteer programs to fight water pollution, preserve Honolulu's waters, and to recycle everything from paper and glass, to asphalt and construction materials. Mayor Harris is intensively involved in the multi-billion-dollar renovation of the Island's sewer system, as well as in a partnership with private industry to reclaim wastewater for agricultural and industrial uses. Before serving as Mayor, he worked for eight years as the City's Managing Director. In this capacity, Mayor Harris was a major force in the development of Honolulu's H-Power program, which uses trash as fuel to generate electricity. In its first six years of operation, the plant processed over four million tons of waste and generated electricity that would have otherwise would have required five million barrels of oil. Mayor Harris specialized in Marine

Biology and Urban Ecosystems, obtaining his Master's Degree from the University of California at Irvine.

ROSALYN S. HOBSON, Associate Professor of Electrical Engineering at Virginia Commonwealth University, is an educator, researcher, and engineer. Her research interests include artificial neural networks and their application to control problems, intelligent systems, biological modeling and signal processing. As one of the founding faculty members of the School of Engineering at Virginia Commonwealth University, she has been instrumental in the establishment and success of the engineering program. She has established a partnership program between VCU and schools in South Africa and is designing a new engineering education program focused on engineering challenges in developing countries. She has served on and chaired numerous committees and developed a research group and laboratory in which projects on neural network applications are conducted. She has been awarded grants from industry and government, directed the research of numerous undergraduate and graduate students, published several articles and has been an invited lecturer in many venues. Additionally she was awarded a AAAS science and diplomacy fellowship to serve at the US Agency for International Development. Officially posted in the USAID Office of Education, Dr. Hobson served as the principal liaison between USAID and the National Academies for a study examining science and technology in US development assistance programs. She also served as a consultant for Invensys Control Systems. Dr. Hobson continues her work with numerous Richmond high schools and with outreach and summer programs that focus on promoting interest in and recruiting students into the engineering profession. Dr. Hobson's awards and honors include: the National Society of Black Engineers' Patricia A Lumpkin Educator of the Year Award, and the Frontiers in Education New Faculty Fellow. She served on the National Academy of Engineering Committee on Engineering Education and was selected for participation in the Stanford University National Science Foundation New Century Scholars Workshop. She has been nominated for the American Biographical Institute 1000 World Leaders of Scientific Influence and Who's Who of American Women 2000. Dr. Hobson received her B.S., M.S., and Ph.D. (1997) in Electrical Engineering from the University of Virginia.

SHARON HRYNKOW is the Acting Director of the Fogarty International Center (FIC) at NIH. Dr. Hrynkow joined the Fogarty International Center in 1995. She has held a range of positions including Assistant Director for International Relations, Director of the Division of International Relations, and Special Assistant to the Deputy Director. She was appointed as Deputy Director of the Center in 2000 and has served as Acting Director of the Center since January 2004. Dr. Hrynkow was selected for an AAAS Science, Engineering and Diplomacy Fellowship at the U.S. Department of State, and then for a position as the first civil service Health/Science Officer within the State Department's Bureau of Oceans and International Environmental and Scientific Affairs. During a period of roughly three years at the Department of State, she worked on a range of health and science issues of import to the U.S. foreign policy community, including HIV/AIDS, chemical safety, and biotechnology. She worked with State Department leadership, interagency partners, NGOs, and business leaders to produce the first "U.S. International Strategy on HIV/AIDS." Dr. Hrynkow received her Bachelor's degree from Rhode Island College. She earned a Ph.D. in Neuroscience at the University of Connecticut Health Center.

JACK A. KAYE is the Director of the Research and Analysis Program of the Earth-Sun System Division in NASA's Science Mission Directorate. In this position, he has responsibility for the broad range of science research carried out in Earth and solar science at NASA centers, academia, other government agencies, and the private sector. Prior to being assigned to this position, he worked as a research scientist, program manager for atmospheric chemistry, and Research Division director for the former Office of Earth Science over his 21 year career at NASA. He represents NASA in

numerous interagency activities related to climate, oceans, and Earth observations, and he serves as a member of the Steering Committee for the Global Climate Observing System. Among his many awards is his recognition in 2004 as a Meritorious Senior Executive. He is trained in chemistry, having received a BA from Adelphi University and a PhD from the California Institute of Technology.

GERALD T. KEUSCH (IOM) is Director of the Global Health Initiative, Assistant Provost of the Medical Campus, and Associate Dean of the School of Public Health at Boston University. Prior to joining the university, Dr. Keusch was the Associate Director for International Research at the National Institutes of Health, and Director of the Fogarty International Center. He has been involved in clinical medicine, teaching and research for his entire career. Dr. Keusch's research has ranged from the molecular pathogenesis of tropical infectious diseases to field research in nutrition, immunology, host susceptibility, and the treatment of tropical infectious diseases and HIV/AIDS. He is involved in international health research and policy issues within the NIH, the Institute of Medicine, and the World Health Organization. Under his leadership, the programs of the Fogarty International Center have greatly expanded to address not only the pressing global issues in infectious diseases and the growing burden of non-communicable diseases, but also the critical cross-cutting issues such as the ethical conduct of research, intellectual property rights and global public goods, stigma, and the impact of improved health on economic development. Dr. Keusch is a graduate of Columbia College and Harvard Medical School, and he is Board Certified in Internal Medicine and Infectious Diseases.

PATRICK LEAHY is the Acting Director of the U.S. Geological Survey (USGS), U.S. Department of the Interior. Dr. Leahy previously served as the Associate Director for Geology of the USGS where he was responsible for Federal basic earth science programs. He was also responsible for all international activities conducted by the USGS. He has been with the USGS since 1974 and has served in other various technical and managerial positions, including Chief of the National Water-Quality Assessment Program. He has authored or co-authored more than 50 publications on a wide array of earth science topics. Dr. Leahy is a Fellow in the Geological Society of America and is a member of the American Geophysical Union, the American Institute of Hydrology (former president), Sigma XI, American Association for the Advancement of Science, the 50th Anniversary Committee of the American Geological Institute, and the Geological Society of Washington. In addition, he was selected by the National Academy of Science to head the U.S. delegation to the 30th International Geological Congress in Beijing, China, in August 1996 and as a U.S. delegate to the 31st International Geological Congress in Rio de Janeiro, Brazil, in 2000. He is also a member and the past chairman of the U.S. National Committee for Geological Science for the National Academy of Sciences. He holds undergraduate and graduate degrees in geology (1968) and geophysics (1970) from Boston College. He received his doctorate in geology (1979) from Rensselaer Polytechnic Institute where he specialized in regional ground-water studies and hydraulics.

KAI LEE is Rosenburg Professor of Environmental Studies at Williams College. He served as director of the Center for Environmental Studies from 1991-98 and is interim director in 2001-02. Lee has continued to teach and conduct research on the relationship between technological change and democratic governance and is currently undertaking a study of urban sustainability. He was chair of the Committee on Long-Term Institutional Management of DOE Legacy Waste Sites at the National Research Council, 2001-03. He serves now on the Water Science and Technology Board at the National Academies. He served on the National Research Council's Board on Sustainable Development and altogether Lee has served on eleven committees of the National Academies of the National Research Council: the Environmental Studies Board (1980-82), the Board on Radioactive Waste Management (1983-88), the Committee to Assess Safety and Technical Issues at Department

of Energy Reactors (1986-87), the mitigation sub-panel of the Panel on Policy Implications of Greenhouse Warming (1989-91), the Committee on Environmental Research (1991-93), the Committee on Protection and Management of Pacific Northwest Anadromous Salmonids (1993-95), the Board on Environmental Studies and Toxicology (1993-95); the Board on Sustainable Development (1995-99); the Commission on Geosciences, Environment, and Resources (1996-99); the Committee on Long-Term Institutional Management of DOE Legacy Waste Sites: Phase 2 (2001-3), and the Water Science and Technology Board (2004-07). Additionally, in 1989 Lee was a member of the United Nations Environment Programme committee reviewing economic aspects of the Montreal Protocol on Substances that Deplete the Ozone Layer. Lee was educated in experimental physics at Columbia (A.B. magna cum laude, 1966) and Princeton (Ph.D., 1971).

J. TODD MITCHELL is President of Houston Advanced Research Center (HARC), a non-profit research organization in The Woodlands, Texas. HARC's mission is to move knowledge to action to improve human well-being and protect the environment. HARC serves as a bridging organization to implement technologies and policies based on the principles of sustainability science. Mr. Mitchell serves on the board of directors for The National Council for Science and the Environment. He has worked in the energy industry since 1986, first as a co-founder of Strand Energy, an oil and gas exploration company, and later as co-founder of Rock Solid Images, a developer of seismic and petrophysical technologies for subsurface reservoir characterization and imaging. Mr. Mitchell is a member of The American Association of Petroleum Geologists and The Society of Exploration Geophysicists. Mr. Mitchell is President of GPM, Inc., a family owned asset management company, on behalf of which he serves as a Director of Devon Energy, one of the country's largest natural gas producers. Mr. Mitchell has a Bachelors degree in Geology from The Colorado College (1981) and a Masters degree in Geology from The University of Texas at Austin (1987). His Masters degree research focused on coral reef ecology, sedimentology, and diagenesis.

PRABHU PINGALI is an economist and Director of the Division of Agricultural and Development Economics at the UN Food and Agriculture Organization (FAO) is the President of the International Association of Agricultural Economists (IAAE). Pingali was Vice-President of the IAAE from 1997-2000 and chairman of the program committee for the 24th International Conference of Agricultural Economists. Pingali has more than 20 years experience in assessing the extent and impact of technical change in developing country agriculture in Asia, Africa and Latin America. Before joining FAO, Pingali was Director of the Economic Program at the International Maize and Wheat Improvement Center (CIMMYT) in, Mexico, the International Rice Research Institute at Los Baños, Philippines and the World Bank's Agriculture and Rural Development Department. An Indian national, Pingali earned his doctorate in Economics at North Carolina State University in 1982 in Raleigh, North Carolina, in the United States.

EDWARD T. SAMULSKI is a Jefferson Science Fellow on assignment at the U.S. Department of State. Dr. Samulski is the Cary Boshamer Professor of Chemistry at the University of North Carolina, Chapel Hill. He joined UNC in 1988 to launch a polymer materials program and served as chair of the department 1995-2000. He is currently co-director of a multi-university NASA University Research Engineering and Technology Institute on Biologically Inspired Materials and is a fellow of both the American Physical Society and the American Association for the Advancement of Science. He started his academic career at the University of Connecticut in 1972, after postdoctorals in The Netherlands and Texas; his Ph.D. is in chemistry (Princeton University, 1970) and BS in textile chemistry (Clemson University, 1965). He's held visiting positions at the Cavendish Lab, the Weizmann Institute, and the University of Paris, and he was a Guggenheim Fellow at Massey University, New Zealand. His research interests include magnetic resonance in

oriented, soft materials (liquid crystals and polymers) and high-yield routes to semiconductor oxide nanorods.

EMMY SIMMONS recently retired from the position of Assistant Administrator for Economic Growth, Agriculture, and Trade at the United States Agency for International Development (USAID). Ms. Simmons has more than 30 years experience in international agriculture and economic development. Since 1997 she has served as USAID deputy assistant administrator in the former Bureau for Global Programs, Research and Field Support, where she headed the Center for Economic Growth and Agricultural Development. From 1994 to 1997, Simmons was senior program officer for USAID's mission in Moscow where she oversaw an aid portfolio of more than \$1 billion. From 1991 to 1994, she served in USAID's regional office for east and southern Africa as supervisory program economist. Simmons also has served as supervisory agricultural officer for Mali and as regional agricultural advisor for West Africa, in addition to holding a number of supervisory positions in the Africa Bureau in USAID's Washington headquarters. She received her B.S. from the University of Wisconsin-Milwaukee; her M.S. in Agricultural Economics from Cornell University.

ROBERT STEPHENS founded and served as President of the Multi-State Working Group on Environmental Performance (MSWG), a national coalition of representatives from government, business, non-governmental organizations, and academic institutions in the US working on transformative policies relating to the environment and sustainable development. Via his continued involvement with the MSWG, Dr. Stephens serves as the Secretariat to the Best Practice Network for Sustainable Development (BPN) for the United Nations Environment Program, Division of Technology, Industry, and Economics. Dr. Stephens retired in July 2004 from the California EPA after 30 years of service, most recently as Assistant Secretary for Environmental Management and Sustainability. In this position, Dr Stephens was responsible for the development and implementation of programs leading to environmental policy innovation and sustainability in California. Over his career, Dr. Stephens also served as Deputy Director of the Department of Toxic Substances Control for Science, Pollution Prevention, and Technology and Chief of the Hazardous Materials Laboratory for the state of California. Dr. Stephens is the primary and/or co-author of some 60 articles and book chapters ranging from basic environmental science and risk assessment to public policy related to the environment and sustainability. Dr. Stephens holds a Ph.D. in Chemistry from the University of California and has held prior positions in industry and academia.

CHARLENE WALL manages the North American Eco-efficiency Analysis program for the BASF Group. She furthers BASF's position as a global leader by facilitating the integration of sustainable development into the North American businesses. In 1992, she joined BASF Corporation, and has held positions in Product Development, Process Design Engineering and Safety and Ecology. In addition, she is the first chairperson for the American Institute of Chemical Engineer's Center for Sustainable Technology Practices.