

## Leading Health Expert to Chair Review Committee



James A. Merchant.

PHOTO BY JAY MALLIN

The HEI Board of Directors has appointed James A. Merchant, a nationally known expert on occupational and environmental health, rural health, and public health policy, to chair the HEI Review Committee. This group of external reviewers — representing the fields of medicine, epidemiology, biostatistics, environmental engineering, and environmental health — works with the HEI staff to evaluate and interpret results of funded studies. Its opinions are published with reports in the form of a Critique or Commentary.

Merchant is the founding dean of the College of Public Health, University of Iowa, Iowa City, and a professor in the college's Department of Occupational and Environmental Health. He will succeed Homer Boushey of the University of California-San Francisco, who is stepping down as chair after eight years, the maximum time HEI allows for service on its scientific committees.

*Continued on page 4*

*Continued on page 2*

## Also in This Issue

Review Committee Process .....	4
HEI in the News .....	4
NEW HEI RESEARCH REPORTS Developing Models for Exposures .....	5
Sharing Insight from NPACT Studies .....	6
New Strategic Plan Taking Shape .....	6
Workshop on Unconventional Oil and Gas Development .....	7
Discussing Research Priorities .....	8



Among the many active contributors to HEI's Annual Conference were Francesca Dominici (inset), Harvard School of Public Health and HEI Research Committee, and Roger McClellan, consultant.

PHOTOS BY JAY MALLIN

## Conference Eyes Future of Air Pollution Research and Policy

More than 170 people from industry, government, nongovernmental organizations, the media, and academic institutions from around the globe gathered in early May in Alexandria, Virginia, for HEI's 28th Annual Conference. The three-day meeting provided a welcome opportunity for participants to hear presentations on topics relevant to air pollution and public health, learn about HEI-funded research, and meet others with similar interests.

This year's opening Sunday session, "The Future of Mobility," focused on the challenges facing transportation systems — particularly the rapid growth of populations and vehicle traffic as well as changing patterns in the ways cities are configured — and their impacts on air quality and climate change. The speakers also described emerging multi-modal approaches aimed at meeting changing transportation needs and reducing harmful effects of vehicles on health and the environment. Geoffrey Anderson of Smart Growth America discussed the impact of urban and suburban sprawl and presented a set of principles for better planning, which include offering a variety of transportation choices and making communities more walkable. In addition, the speakers



Homer Boushey, University of California–San Francisco, outgoing chair of the HEI Review Committee, and Barbara Hoffmann, IUF-Leibniz Research Institute for Environmental Medicine and Heinrich Heine University of Düsseldorf, Germany, a recent appointee to the Research Committee.



Michael Walsh (left), founding chair, International Council on Clean Transportation, accepts an award from HEI President Dan Greenbaum (center) and Vice President Robert O'Keefe in appreciation for his four decades of environmental service.



Nga Lee (Sally) Ng, Georgia Institute of Technology, and Ron Wyzga, Electric Power Research Institute.



Margo Oge, former director, Office of Transportation and Air Quality, U.S. Environmental Protection Agency.



Ying-Ying Meng, University of California–Los Angeles.

#### CONFERENCE (Continued from page 1)

described upcoming changes in vehicle fuels and technology, including self-driving cars, as well as the health and environmental effects of active modes of transport, particularly cycling. Timothy Papandreou of the San Francisco Municipal Transportation Agency outlined how San Francisco has been making changes to its transportation systems and how it envisions future mobility in the city.

Harvey Fineberg, president of the Institute of Medicine of the U.S. National Academies, was the keynote speaker on Sunday night. Fineberg discussed the Academies' mission, drawing parallels to HEI's own independent model. He explained the reciprocal relationship between science and policy, outlined the most important work of the Academies, and defined criteria for influential studies.

The annual "HEI Update" session on Monday morning began with the introduction of the HEI Research and Review committees, followed by the presentation of the 2013 Walter A. Rosenblith New Investigator Award to Nga Lee (Sally) Ng of the Georgia Institute of Technology (see *HEI Update*, spring 2014). The award, named for the first chair of the HEI Research Committee, supports the work of a promising scientist early in his or her career. HEI Director of Science Rashid Shaikh presented highlights of the institute's progress in meeting the objectives of the HEI Strategic Plan for 2010–2015 and reported on HEI's efforts to streamline its publications processes and communication strategies. HEI Vice President Robert O'Keefe then introduced HEI's new project, independently funded by Appalachian-area foundations, where the institute's scientific model is being applied to craft a

plan to guide research on the effects of unconventional oil and gas development in the Appalachian region (see related story).

Jacob McDonald of the Lovelace Respiratory Research Institute presented the final results from the Advanced Collaborative Emissions Study (ACES), which involved toxicologic experiments with emissions from diesel engines compliant with U.S. Environmental Protection Agency (EPA) standards. In the final phase of the study, investigators measured lifetime animal exposures to emissions from a 2007-compliant diesel engine and found minimal health effects in rats. Jack Harkema of Michigan State University presented results from the Pathology Working Group, an independent ACES review team recruited by HEI. Both speakers noted how animal health effects associated with exposure to exhaust from the newer-technology diesel engines differ significantly from effects associated with older engines. (HEI will publish a final report on the ACES findings later this year.)

Next was a session entitled "Can We Breathe More Easily? Chronic Respiratory Disease and Air Pollution," which explored the role



David Christiani, Harvard School of Public Health and HEI Research Committee.

*Continued on page 3*



Richard Celeste (right), chair of the HEI Board of Directors, presents a framed nature photograph to Homer Boushey, University of California–San Francisco, in appreciation for Boushey's eight years of service as chair of the HEI Review Committee.



Rashid Shaikh, HEI director of science.



Karen Wesson, U.S. Environmental Protection Agency.



Edward Avol, University of Southern California (left), and Alan Leinbach, U.S. Environmental Protection Agency.



Current and past recipients of the Walter A. Rosenblith New Investigator Award, from left: Jason Surratt, University of North Carolina–Chapel Hill; Nga Lee (Sally) Ng, Georgia Institute of Technology; Richard Peltier, University of Massachusetts–Amherst; Jun Wu, University of California–Irvine; Jiu-Chuan Chen, University of Southern California; and Juana Maria Delgado-Saborit, University of Birmingham, United Kingdom.

#### **CONFERENCE (Continued from page 2)**

of air pollution in two chronic respiratory conditions — chronic obstructive pulmonary disease (COPD) and asthma. The speakers discussed what is currently known about these conditions, their mechanistic pathways, the role air pollution may play, and how further research could reduce uncertainties. Homer Boushey of the University of California–San Francisco, the outgoing chair of the HEI Review Committee, discussed possible links among asthma, air pollution, environmental exposures, and the human microbiome.

During lunch on Monday, Michael Walsh, founding chair of the International Council on Clean Transportation, provided a global and historical perspective on transportation and air pollution. He highlighted vehicle emissions in urban areas, transportation-related air pollution concerns, progress in technology and regulations aimed at controlling automobile emissions, and current challenges in India and China. HEI took the opportunity to honor him for his work and contributions.

The Monday afternoon session, “Multipollutant Research: Challenges and Progress,”

examined recent work in developing methods to study the effects of exposure to air pollutant mixtures. Francesca Dominici of the Harvard School of Public Health and the HEI Research Committee discussed the motivations underlying such work, including the need to estimate how exposure to multiple pollutants simultaneously might affect health and shape air-quality policies aimed at controlling multiple pollutants at the same time. Karen Wesson of the EPA then spoke about the agency’s multipollutant initiatives and their potential value in future policy-making. Brent Coull of the Harvard School of Public Health presented a survey of ongoing multipollutant methods research, including several studies supported by HEI.

Joel Kaufman of the University of Washington introduced the Tuesday morning session, “New Directions in Air Pollution Research and Risk Assessment,” by tracing the evolution of study designs, exposure assessment, and monitoring. Other topics included promising new ways to improve air pollution studies through personal exposure assessment, new tools for obtaining individual-level health data for

population studies, and the EPA’s “Next Generation” of risk-assessment methods.

The final conference session, led by HEI President Dan Greenbaum and Vice President O’Keefe, addressed the development of the HEI Strategic Plan for 2015 through 2020, as well as HEI’s progress in meeting the current (2010–2015) plan’s objectives. They described the science and policy issues that the Strategic Plan might potentially address, such as informing decisions on air-quality standards; examining the health effects of exposure to emissions from ports and vehicular traffic; studying the relationships among climate change, air quality, and health; and evaluating the need for health-outcomes studies. 

The final conference program and all presentation slides are available at [www.healtheffects.org/annual.htm](http://www.healtheffects.org/annual.htm). Registration information for next year’s Annual Conference, scheduled for May 3–5, 2015, in Philadelphia, Pennsylvania, will be available at the same Web page early in 2015.

CONFERENCE PHOTOS BY JAY MALLIN

"HEI is honored to have Jim Merchant join us as chair of the Review Committee, which plays a key role in ensuring the quality of HEI's work," said Dan Greenbaum, HEI president. "It was not easy finding a suitable replacement for Homer Boushey, who has done an extraordinary job," he added, "but we are pleased that Jim Merchant will bring strong expertise and a new perspective to the role."

Merchant received his bachelor's degree from Iowa State University and his doctor of medicine degree from the University of Iowa. He also received a doctor of public health degree in epidemiology from the University of North Carolina at Chapel Hill. Early in his career, he studied the risk of exposure to cotton dust, which can lead to brown lung disease. This work led the federal government to establish the 1978 Cotton Dust Standard, which has saved hundreds of thousands of lives.

More recently, Merchant has continued to advocate for workplace safety — for example, by raising awareness of the occupational hazards in rural and agricultural settings — which has advanced the prevention of workplace injuries. His other research interests

include the epidemiology and prevention of childhood asthma, environmental health science, occupational medicine, rural and public health policy, and rural and occupational health.

Merchant has served as a special assistant to the director of the U.S. Occupational Safety and Health Administration, as director of the Appalachian Laboratory for Occupational Safety and Health, and as director of the Division of Respiratory Disease Studies at the National Institute for Occupational Safety and Health (NIOSH). He is a member of the Institute of Medicine of the U.S. National Academies. At the National Research Council, he has served on the Committee on Non-Occupational Health Risks of Asbestiform Fibers and the Committee to Review the NIOSH Respiratory Diseases Research Program, and he has been a member of numerous other committees and panels.

Merchant has received many honors and awards, including the 2010 John M. Peters Award for outstanding contributions to environmental or occupational health through leadership in research, education, or public health from the American Thoracic Society. [HEI]

## So Just What Does the HEI Review Committee Do?

Here is a summary of the HEI review process that Jim Merchant will lead.

### Objectives

- Provide critical and impartial evaluation of HEI-funded research
- Ensure credibility of research findings
- Place results into scientific and regulatory context
- Identify future research opportunities



Review Committee opinions are published with reports in the form of a Commentary or a Critique.

### Process

- External peer reviewers evaluate investigator's final report
- Review Committee evaluates report and recommends revisions
- Investigator submits revised final report
- Review Committee and science staff develop Commentary, which critiques study and interprets findings
- Editorial staff prepares report for publication
- Review Committee approves Commentary; Board approves process
- HEI publishes Research Report on Web site and in print

### Special Attributes of Review Process

- In-depth external and internal review
- Independence from Research Committee that selected and monitored research
- Results of all HEI-funded work, both positive and negative, are available to the public
- Review Committee's Commentary on the research and results [HEI]

## HEI in the News

### Nature magazine

#### "Air of Danger" (May 29, 2014)

HEI Principal Scientist Aaron Cohen is quoted in this story, which cites research on the health effects of airborne and other environmental carcinogens and concludes by noting the increased call for regulatory measures to prevent exposure to them. "To clean up the air — that's the solution," Cohen says. "It's not to make people sit in their houses or walk around with masks on."

### Risk Policy Report

#### "EPA Seeks to Limit Diesel Exposures but Declines to Revise Risk Analysis" (May 27, 2014)

This article reported that the Environmental Protection Agency (EPA) has decided it lacks sufficient current epidemiologic data to update its 2002 Integrated Risk Information System assessment of the risk of cancer from exposure to diesel exhaust and will focus instead on limiting exposure. The story noted that the EPA has partnered with HEI to examine the newest diesel epidemiology studies more closely — a process that might eventually "open the door" to revising the assessment. (HEI's Diesel Epidemiology Panel, formed in 2013, is charged with reviewing the literature; see *HEI Update*, Spring 2013). [HEI]

## Developing New Models for Ultrafine Particle and Air Toxics Exposures

**I**nvestigators for two recently published HEI studies set out to improve models for measuring exposure to air pollution. These reports, summarized below, are available for downloading free of charge at <http://pubs.healtheffects.org>; printed copies can be purchased from HEI.

### Aerosol Screening Model for Size-Resolved Urban Aerosols

In the urban atmosphere, ultrafine particles (UFPs) are derived from motor vehicles, among other sources, and their concentrations vary greatly near traffic sources. Given this variability, exposure to UFPs is difficult to model. In a three-year study, Charles O. Stanier of the University of Iowa — a recipient of HEI's Walter A. Rosenblith New Investigator Award — and his colleague Sang-Rin Lee tested a new approach. Their results appear in the recently published HEI Research Report 179, *Development and Application of an Aerosol Screening Model for Size-Resolved Urban Aerosols*.

The investigators developed and evaluated an aerosol screening model to predict concentrations of UFPs in near-road environments with high spatial resolution. The model is based on the Lagrangian modeling framework, which assumes that columns of air parcels move downwind with larger “steps” when far from receptors and smaller steps when close to receptors. The investigators assessed the performance of the model in California by comparing the 1-hour and 24-hour-average simulations with the corresponding measured concentrations at 11 sites in the Los Angeles basin that varied in their distance from roads with heavy traffic. They also evaluated how well the model predicted distributions of particle sizes at two sites near busy roads in Long Beach.

For the 24-hour measurement, the model's performance was not far from the preset targets. For the 1-hour average number concentrations, the model's performance was poor and did not capture the diurnal variations observed at several sites. In general, its performance was better at sites that were farther from freeways and had a lower volume of heavy-duty vehicles than at sites near freeways. The investigators found that when the modeled values failed to fall in the specified ranges, the model typically underestimated the particle concentrations. Sensitivity analysis showed that the model was sensitive to traffic volume and type, as well as to road type. The modeled size distributions differed from the measured distributions for many of the simulations.

In its independent review of the study, the HEI Review Committee noted that the strengths of the model are its flexibility to incorporate additional processes, the automated procedure to process road network and traffic data, and the synthesis of emissions data on particle number by size from various research groups (a complex task). But they felt that Stanier and Lee had chosen a high level of complexity for a screening model, that the model would require additional simplifications for actual screening applications, and that additional information would be needed for more detailed applications.

For more information about Research Report 179, contact Maria Costantini ([mcostantini@healtheffects.org](mailto:mcostantini@healtheffects.org)).

### Further Analyses of the RIOPA Data: Estimating Personal Exposure to VOCs

Epidemiologic studies of the effects of air pollution on health commonly use outdoor pollution levels measured at one or more sites within a community as a surrogate for human exposure. Yet people spend a majority of their time indoors. In addition, certain activities (such as driving, cooking, and smoking) can contribute substantially to personal exposure. HEI's Relationships of Indoor, Outdoor, and Personal Air (RIOPA) study, published in two parts (2005 and 2007), addressed the challenge of understanding how different sources contribute to individual exposure to air toxics and particulate matter. (HEI made the RIOPA data publicly available at <https://riopa.aer.com/login.php>.) Subsequently, HEI funded two studies to apply new and innovative statistical methods to analyze this rich data set. Results from the first of these two appear in HEI Research Report 181, *Personal Exposure to Mixtures of Volatile Organic Compounds: Modeling and Further Analysis of the RIOPA Data*, published this past June.

Stuart Batterman of the University of Michigan in Ann Arbor and colleagues analyzed data from RIOPA and from the National Health and Nutrition Examination Survey. Their goal was to identify factors that influence exposure and to characterize various exposure distributions for individual volatile organic compounds (VOCs) and their mixtures, with particular emphasis on high exposures (extreme values).

The investigators found that factors influencing personal exposure included the city of residence, wind speed, home air-exchange rate, number of rooms in the home, whether there was an attached garage, exposure to fumes from pumping gas, and exposure from other family members showering.

In its independent review of the study, the HEI Review Committee noted that it was well conceived and conducted. The committee thought the analyses of factors that influence exposure were a novel and useful contribution. The analyses focusing on extreme values were considered interesting, although their interpretation was problematic. The committee did not agree with the way the investigators treated low and high values. Values below the limit of detection were replaced with a single value, and this approach, while common, can cause problems when the number of such low values is considerable. The deletion of a few high values that the investigators considered “outliers” was not adequately justified, according to the committee.

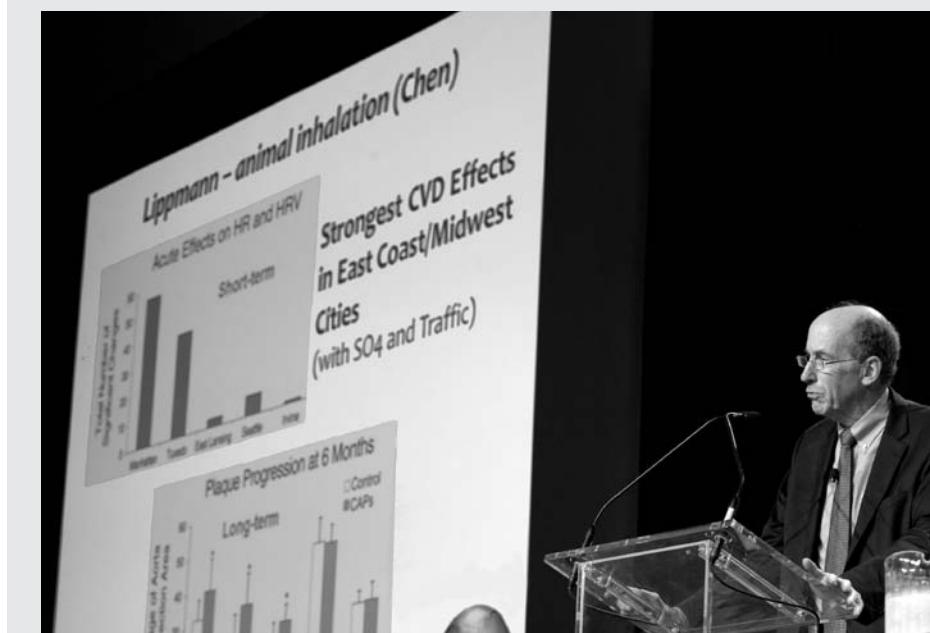
All in all, the committee felt that the application of mixture models to exposure and risk assessment warrants more research, especially since such models make use of the whole distribution (low and middle as well as high values), rather than high values only. This feature is important, since concentrations at lower levels also contribute to the total risk to health. [HEI]

For more information about Research Report 181, contact Hanna Boogaard ([jboogaard@healtheffects.org](mailto:jboogaard@healtheffects.org)).

## Sharing Insight from NPACT Studies

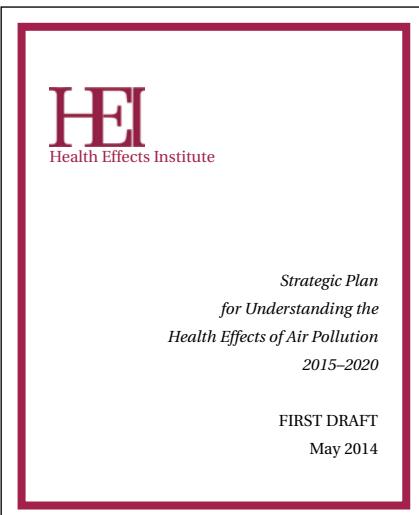
HEI President Dan Greenbaum presents results from the National Particle Component Toxicity (NPACT) initiative at the Air & Waste Management Association's 107th Annual Conference and Exhibition, held in June in Long Beach, California. His talk followed the presentation of a critical review by Thomas Grahame of the U.S. Department of Energy and others entitled "Public Health and Components of Particulate Matter: The Changing Assessment of Black Carbon." Greenbaum was among a group invited to critique the presentation and the authors' conclusions.

PHOTO COURTESY OF A&WMA



## HEI's Strategic Plan for 2015–2020 Taking Shape

**H**EI's vision for the future — 2015 to 2020, and beyond — is taking shape in the new *HEI Strategic Plan for Understanding the Health Effects of Air Pollution* (see *HEI Update*, Winter 2013–2014). After the institute consulted with a wide range of sponsors and stakeholders, as well as its committees, a first draft of the HEI Strategic Plan for 2015 through 2020 was released in May, just before HEI's 2014 Annual Conference. That first draft (still available at [www.healtheffects.org](http://www.healtheffects.org)) encompassed a far broader set of potential activities for HEI than it could hope to engage in and engendered a range of very valuable comments at the conference and in written comments in the following weeks. Based on those comments, HEI staff are now revising the plan and adding a detailed timeline for implementation. Following final review by the HEI committees, sponsors, and the Board of Directors, the plan is expected to become final in early 2015. [HEI]



### Health Effects Institute

101 Federal Street, Suite 500  
Boston, MA 02110-1817, USA  
Phone: +1-617-488-2300  
Fax: +1-617-488-2335  
[www.healtheffects.org](http://www.healtheffects.org)

Richard F. Celeste, Chair, Board of Directors  
Daniel S. Greenbaum, President

HEI is a nonprofit organization funded jointly by government and industry to research and evaluate the health effects of air pollution. An overview of HEI, information on its current research program, and all published HEI reports are available for downloading, free of charge, from the Web site.

Production Staff for *Update*:

Barbara Gale, Director of Publications

Hope Green, Editor

AnneMoon M.M. van Erp, Webmaster

Jacqueline Presedo and Margarita Shablya, Web Assistants

Ruth E. Shaw, Cameographics, Layout and Composition

### SIGN UP: HEI NEWSLETTER ONLINE

To sign up for free e-mail delivery of *HEI Update*, send a message to [pubs@healtheffects.org](mailto:pubs@healtheffects.org), and we will add you to our e-subscribers mailing list. Let us know if you would also like to continue receiving the paper version.

# A Need for Knowledge

## Diverse Concerns Aired at Workshop on Unconventional Oil and Gas Development

In the United States and around the globe, the rapid expansion of oil and natural gas production has raised questions and controversy, with scientists and policy makers attempting to assess the potential effects on people and the environment. As reported earlier in *HEI Update* (Spring 2014), HEI has been selected by the Pennsylvania-based Shale Gas Roundtable, a group of government, industry, academic, environmental, and civic leaders, to explore such concerns



Alan Ducatman of West Virginia University, a member of HEI's Special Committee on Unconventional Oil and Gas Development.

and to craft a strategic plan recommending priorities for scientific research. This unique and challenging project has just begun. In June, as a key first step, HEI's Special Scientific Committee on Unconventional Oil and Gas Development hosted a public workshop in Pittsburgh, Pennsylvania.

The meeting gave the committee — composed of leaders in a range of scientific disciplines — a chance to hear from other national experts and knowledgeable people living and working in the Appalachian

Basin, where shale gas development is widespread. Participants included academic scientists, high-level federal and state officials, representatives of industry working actively in the region, and leaders from nongovernmental organizations evaluating ecologic and human health concerns, some of which are working directly with local communities near natural gas operations. Committee Chair George M. Hornberger, a professor at Vanderbilt University and director of the Vanderbilt Institute for Energy and the Environment in Nashville, Tennessee, served as facilitator.

The wide-ranging and informative discussion included a series of technical talks that addressed the technology of oil and gas development; potential implications for human health, communities, and the environment; and recommendations for scientific research to understand these implications. Special advisors to the committee, Bernard R. Goldstein of the University of Pittsburgh and Alan J. Krupnick of Resources for the Future, gave two of these talks, drawing on their extensive expertise in the area. Workshop participants then shared opinions about potential impacts and research priorities in a productive exchange with committee members.

Ideas from the workshop will inform the committee as it begins the complex task of drafting a comprehensive plan to guide future study of the health, ecologic, environmental, and social implications of oil and gas development in the Appalachian region, with the goal that this plan will serve as a model for research plans in other regions. A summary assessment of the scientific literature is due later this year, and a final *Strategic Research Plan for Understanding the Potential Impacts of Unconventional Oil and Gas Development* is anticipated in the fall of 2015. [HEI]

The workshop was hosted by HEI with organizational support from the Pittsburgh Institute of Politics. The project is funded by a series of Appalachian-region foundations.

Slides from the presentations are available at [www.healtheffects.org/UOGD/UOGDWorkshop2014.html](http://www.healtheffects.org/UOGD/UOGDWorkshop2014.html). For more information, contact Donna J. Vorhees (+1-617-488-2317; [dvorhees@healtheffects.org](mailto:dvorhees@healtheffects.org)).



From left, Andrew Place, EQT Corporation; Peter DeCarlo, Drexel University; Allen Robinson, Carnegie Mellon University, HEI Review Committee, and Special Committee; and Mitchell Small, Carnegie Mellon University.



Alan Krupnick, Resources for the Future (above), and Bernard Goldstein, University of Pittsburgh, are advisors to the Special Committee.



PHOTOS © COURTESY OF UNIVERSITY OF PITTSBURGH



## Health Effects Institute

101 Federal Street, Suite 500  
Boston, MA 02110-1817



Arden Pope (left), Brigham Young University, and Richard Smith, University of North Carolina—Chapel Hill and HEI Research Committee.



Jonathan Samet, University of Southern California, and Hanna Boogaard, HEI science staff.

## Discussing Research Priorities

**H**EI has launched an initiative to estimate the shape of the exposure-response function for mortality and morbidity from chronic disease associated with long-term exposure to low levels of ambient air pollution. In June, 28 leading air pollution researchers attended an HEI workshop to discuss the work needed in this area of study. To solicit proposals from scientists, the institute plans to issue a Request for Preliminary Applications in November. [HEI]



From left: Jon Heuss, formerly of General Motors, now a consultant at Air Improvement Resource; Fred Lipfert, an independent consultant; and Bryan Hubbell, U.S. Environmental Protection Agency,



Jennifer Parker, National Center for Health Statistics.

PHOTOS BY PAUL SCHNAITTACHER