Core D:
Administration and Research Coordination

Core Directors:
John Godleski and Petros Koutrakis
ABSTRACT – Administration Core (Core D)

The Administration and Research Coordination Core will provide oversight, coordination and integration of the Center's activities within and between projects in the Harvard Medical area and also with EPA and the other PM Centers. This Core will be responsible for administration and organization, fiscal management, research management, research integration, research coordination, oversight of data management between projects, and communication.

The Center Director and Deputy Director will be responsible for the overall administration and management of the Center. They will work in close collaboration with the Steering Committee consisting of the Research Project and Core leaders. An external Science Advisory Committee will provide annual review and guidance on progress and priorities. Research integration will be achieved through regular meetings of a Working Group on Air Pollution Health Effects, a Work in Progress Seminar, a Journal Club, and Center Workshops. In addition, research activities will be integrated across the other Centers through regular Director's teleconferences and annual meetings of the Consortium of EPA Centers.

A major strength of our current Center's program has been an ability to redirect research to respond to recent findings and specific EPA needs. Thus, we have an established system in place to continually review and redirect Center research. The Center Steering Committee will continuously monitor research progress and developing research issues. The Center Investigators will present results and progress annually to the external Science Advisory Committee and will seek guidance on research priorities. In this application, we present five proposed research projects which have been defined by this process as providing cutting edge approaches to our central topic and theme, which are the health effects of air pollution mixtures across life stages. Each Project will be monitored and evaluated for progress and relevance, and may be modified or replaced over the five years of Center support.

The final objective of the Center is to make the results of this research available through peer-reviewed scientific publications, and also to disseminate our findings in ways that are accessible to policy makers and the lay public. To this end we will present Center results in scientific conferences, hearings and other public forums, and will maintain an informative website that presents our results in accessible formats and provides links to detailed results.

This Core is expected to provide the day to day administrative needs of center and to create an atmosphere of scientific cooperation and collaboration resulting in significant advancement and dissemination of scientific knowledge.
1. OBJECTIVES

The Administration and Research Coordination Core will support the Research Projects and Cores of this proposal through coordination, integration, fiscal management, providing for external review (via the Science Advisory Committee), liaison with EPA administrators and scientists, and connections with other EPA Centers. This Core will oversee organizational, budgeting and reporting aspects of the Center and provide the leadership for scientific and programmatic activities. The goal of the Administrative Core is to provide overall oversight, coordination, and integration of the Center's activities within and between its projects, and Cores and also with EPA and the other PM Centers.

The specific objectives of this Core are:

1) To provide the administrative infrastructure needed to coordinate and integrate the Research Projects and Cores of the Center, and the interactions of Center investigators with EPA administrators and scientists and with scientists from other EPA Centers;

2) To assure and monitor the productivity and effectiveness of the Center and its components;

3) To organize meetings and implement recommendations of the Steering Committee and the Science Advisory Committee;

4) To enrich the intellectual environment in the EPA Center and at the Harvard School of Public Health (HSPH) through seminar programs, focused research workshops and retreats; and

5) To coordinate the activities of the EPA Center with the rich array of the other air pollution-related institutional environmental activities within the Department of Environmental Health, the Harvard School of Public Health, the Harvard Medical School, the Affiliated Hospitals in the Harvard Medical Area in Boston, and the Harvard Center for the Environment based in Cambridge.

The Administration and Research Coordination Core will be specifically responsible for:

- administration and organization;
- fiscal management;
- research management;
- research integration;
- research coordination; and
- communication and dissemination.

Each of these activities is described in the following sections.
2. APPROACH

2.1. Center Administration and Organization: The Administration and Research Coordination Core will be responsible for all administrative activities including administrative, secretarial, and fiscal management; central data management and quality assurance; organizing working group meetings, seminars, and Science Advisory Committee meetings, preparation of progress reports, and communication with EPA and other institutions. We have defined a hierarchical organizational structure consisting of the Center Directors, a Center Steering Committee, and an external Science Advisory Committee.

2.1.1. Center Directors and Administrative Contact: Dr. Petros Koutrakis will serve as a Center Director and will oversee all scientific aspects of the Center. Dr. John Godleski (Center Deputy Director) will oversee all administrative and fiscal issues for the Center and will work closely with the Center Director. The Deputy Center Director will be assisted by Alice Smythe, who will be appointed as the Center Coordinator and will carry out most day-to-day scheduling, distribution of notices, and internal communications. The Center Director and Deputy Director will be responsible for administration and management of the Center research, for facilitating interactions and collaborations between Center investigators, and fostering collaborations with investigators outside the Center at Harvard, other local research institutions, other Centers, and EPA. They are responsible for organizing and running monthly meetings of the Steering Committee, annual meetings of the Science Advisory Committee, and seminars and meetings of Center investigators. They will also serve on the PM Centers Directors Committee and represent the Center within Harvard University, external scientific meetings, and at public meetings and hearings.

Dr. Godleski will serve as the primary administrative contact with the EPA project officers. Dr. Godleski will also be responsible for ensuring that needed information on human subjects, animal welfare, Center publications, press releases, progress reports, quality assurance, Science Advisory Committees, and other documentation is provided to the EPA project officers in a timely fashion.

Dr. Koutrakis has successfully managed and led the Harvard EPA Center since its inception, and will continue in this role. He is a skilled investigator with strong managerial skills. He served as Technical Editor of the Journal of the Air and Waste Management Association. The large-scale monitoring studies that he has conceived, organized, and managed, including those described in the proposed Center and others also attest to his capabilities and skills. Dr. Godleski has served as Deputy Director of the Harvard EPA Center over the past 3 years. He has headed the ambient particle research Core in the Harvard NIEHS Center and was PI of a productive NIEHS Program Project. Drs. Koutrakis and Godleski have worked together closely in research projects for more than 10 years, and our current Center has benefited from their synergistic and complementary capabilities and efforts.

2.1.2. Center Steering Committee: The Center will be overseen by a Steering Committee consisting of the Center Director (Dr. Koutrakis), the Deputy Center Director (Dr. Godleski), the Financial Director (Ms. Susan Cohn-Child), the Principal Investigators (PIs) of the Research Projects and Cores: Drs. Joel Schwartz, Murray Mittleman, Diane Gold, Frances Dominici, and
Brent Coull. The Steering Committee will meet monthly at our Center's operational headquarters, located in the Harvard Landmark Center, to monitor research progress, to review research initiatives within the Center and outside of the Center, and to manage operations. Steering Committee meetings will be held in the Exposure, Epidemiology, and Risk conference room at Harvard, which is fully set up for telephone and video-conferencing, with up to four outside participants so that full committee attendance can be assured.

2.1.3. Science Advisory Committee: A multi-disciplinary Science Advisory Committee of nine distinguished scientists (six non-governmental and three from EPA or other government agencies) will be established to provide input into both ongoing and future research directions. The Advisory Committee will include experts in a range of disciplines, including Exposure Assessment, Atmospheric Chemistry, Epidemiology, Toxicology, Biostatistics, Cognitive, Cardiac and Respiratory Health, Risk Assessment, and Public Policy. They will be nominated by members of the Center Steering Committee and invited to participate in the Science Advisory Committee by Dr. Koutrakis. Some committee members will be recruited from other Centers to foster and facilitate exchange and collaborations.

The Committee will meet annually for two days at our Center to review formally the Center's activities. The first meeting day will be devoted to the traditional presentation of study designs and results, during which the PI of each Project and Core will present his/her team's progress and insights from the preceding year, and current research plans. This will be followed by a structured workshop on the second day to define research needs and priorities. This workshop will include both the Committee members and the Center Investigators.

The members of the Science Advisory Committee will select a Chair at their first meeting. Following each SAC meeting, the Chair will be responsible for soliciting comments from the SAC members, and preparing a written report to the Center Director, with a copy to the EPA Project Officer. Within three months of receiving the written recommendations from the SAC, the Center Director will submit a formal letter to the EPA Project Officer and the SAC Chair, with a response to the SAC comments, and a plan for how the Center will implement recommendations.

2.2. Fiscal Management: All fiscal administrative duties will be directed by Ms. Susan Cohn-Child, Financial Administrator at the Exposure, Epidemiology, and Risk Program. She will provide quarterly budget summaries and projected expenditures. Ms. Cohn-Child and Dr. Koutrakis will be responsible to the Assistant Dean for Administration of the Harvard School of Public Health, Ms. Laura Ketchum, for overall fiscal administration of the program.

2.3. Research Management: Research management of the Center will include data management, quality assurance, and compliance with regulations regarding the use of humans and vertebrate animals in research.

2.3.1. Data Management: The research staff at Harvard School of Public Health has considerable experience working with large exposure, epidemiological, and toxicological data sets. The PIs of the Research Projects and Cores will be responsible for processing and analyzing data for their individual projects, and data from each of the projects are stored and managed
centrally. Ms. Tania Kotlov will be responsible for oversight of Health Data Management and Dr. Choong Min Kang will be responsible for Exposure Data Management. The Data Managers will provide the following lines of support for the Research Projects and Cores: 1) Centralized expertise and resources for management, quality control, quality assurance, storage, and access to Project and Core data; 2) centralized data tracking, processing, quality assurance procedures, and documentation management; and 3) accessibility of data to Center investigators in a timely fashion, through a centralized, shared-access study database with regular back-up and archiving. The Data Managers will also receive and compile standardized progress reports of data collection and processing from each of the Projects and Cores for review at the regular meetings of the Center Steering Committee.

2.3.2. Quality Assurance: Each research project has an identified Quality Control liaison (see Quality Management Plan). These project specific QC liaisons report to the independent Center QA/QC Officer, Jose Vallarino, who reports directly to the Center Director, Dr. Koutrakis. Mr. Vallarino is a Senior Scientist at the Exposure, Epidemiology and Risk Program, who has considerable experience preparing and reviewing laboratory and field protocols and quality control procedures. He is the QA officer for the current EPA Center and has worked extensively with the EPA Project Officers.

2.3.3. Human Studies: The PI of each Research Project involving human subjects will be responsible for obtaining individual review and approval for his/her Project's human subjects research plan from the Harvard School of Public Health Human Subjects Committee. The Administration and Research Coordination Core will maintain records of Human Studies review and compliance. In addition, the Administration and Research Coordination Core will ensure that all staff in contact with human subjects or identifiable subject data that have received appropriate Human Studies and HIPAA training, and will maintain records of this training. Mr. Jose Vallarino is the Center's human subject protocol coordinator, and works closely with the Human Subjects committee, the project investigators, and the EPA project manager, and he will continue in that capacity.

2.3.4. Vertebrate Animals: The Center assures humane practice in animal maintenance and experimentation, and subscribes to the concept of using every acceptable method in the performance of Center research to minimize the use of animals and to prevent animal distress. The PI for each Research Project involving vertebrate animals will be responsible for obtaining protocol approval from the Harvard Medical Area Standing Committee on Animals. The Administration and Research Coordination Core maintains records of Vertebrate Animal Studies review and compliance.

Veterinary and diagnostic services are provided by the Animal Resources Center at the Harvard School of Public Health. The Harvard School of Public Health is accredited by the American Association for the Accreditation of Laboratory Animal Care, and meets National Institutes of Health standards as set forth in the "Guide for the Care and Use of Laboratory Animals" (DHEW Publication No. [NIH] 78-23 Revised). The institutional Standing Committee on Animals periodically reviews the care and treatment of animals in all Harvard School of Public Health animal facilities to assure compliance with law and good laboratory practice.
The PI, laboratory personnel, and animal technicians involved in any way in proposed research involving the use of animals will have instruction or demonstrated competence in the care, use, and handling of laboratory animals. The Administration and Research Coordination Core maintains records of certifications.

2.4.1. Working Group on Air Pollution Health Effects: The Center will continue to host and benefit from our Working Group on Air Pollution Health Effects, which fosters informal interactions among the Center Investigators and interactions with other Investigators in the Harvard area. This established working group will continue to meet weekly. It includes multi-disciplinary experts in exposure and risk assessment, epidemiology, toxicology, clinical medicine, and physiology. The proposed EPA Center will provide Core support for Working Group activities. In addition to the weekly meetings, these activities will include bi-monthly series of informal Work-In-Progress Seminars, a Journal Club, and Workshops (all described below).

2.4.1.1. Working Group Weekly Meetings: The Working Group on Air Pollution Health Effects has met weekly on Tuesday mornings for the past 10 years. This forum has given rise to major advances as a result of its informal interactions among investigators working on exposure assessment, controlled animal exposure studies, and human epidemiology studies.

For example, results of observational epidemiologic studies presented at these weekly meetings led to our design of CAPs inhalation studies in animal models of human disease, including those proposed in the toxicology studies of the proposed Project 1. These laboratory studies provided validation of our current Center's epidemiological findings, and also led us to formulate specific hypotheses regarding the effects of particles on the cardiac health for testing in human epidemiologic studies. In subsequent panel studies of elderly we found associations between heart rate, heart rate variability, blood pressure, cardiac ischemia and particle exposures, confirming results of our laboratory and human studies. Most recently, EPA Center supported studies indicating increases in measured reactive oxygen species in the heart in animals have been related to autonomic nervous system influences. Epidemiological studies have followed on these studies and examined the relationships between people with genotypes with greater or lesser ability to handle reactive oxygen species and their response to increases in ambient particulate in terms of heart rate variability. Taken together, these studies provide unique insights into the relationships of reactive oxygen species and autonomic nervous system activity. Because of close collaboration between our toxicology, epidemiology, and particle chemistry groups, as illustrated by these examples and fostered in part by the success of the Working Group, we have published numerous findings on associations between particle health effects, specific constituents of fine particulate matter, and mechanisms of these effects.

2.4.1.2 Working Group Involvement with Collaborators from Projects 2, 3, 4, and 5: Our collaborators for the proposed Projects 2 (NAS), 3 (Framingham Study) and 4 (Viva Study) are all located within the Boston area, and will be able to participate in working group meetings. Any collaborator may join a Working Group meeting by telephone. This will also be the mechanism for Working Group involvement with those of our collaborators for Project 5 (National Study) who are not located near Boston. When detailed discussions are to focus on a
specific project, collaborators from the other projects will be encouraged to attend and participate in discussions in person.

2.4.1.3. PM Work in Progress Seminars: Under the auspices of the Working Group and with direct support from the Center, we hold a bi-monthly PM Work in Progress seminar on Friday mornings. Each Center investigator informally presents their research at least once each year. This seminar also provides a forum for other PM researchers at Harvard and the affiliated institutions to present their work. In addition, we use this forum to bring in experts from outside the Boston community to present their work. Recent invited outside speakers have included Dr. Mark Frampton of the University of Rochester, Dr. Bert Brunekreef of the University of Utrecht, Dr. Peter Gehr of the University of Berne, Dr. Aruni Bhatnagar of University of Louisville, Dr. Philip Landrigan of Mount Sinai Medical Center in New York, Dr. Ed Avol from University of Southern California, and Dr. Ian Gilmour of the US EPA at Research Triangle Park.

These seminars are open to the public, and are advertised through an e-mail list and are posted on the Center website and the Harvard School of Public Health Calendar. Attendance averages approximately 25 per session, and includes investigators, students and fellows from Harvard Schools of Public Health and Medicine, the affiliated hospitals, Harvard College, MIT and the Health Effects Institute. These seminars have been and will continue to be organized by Drs. Koutrakis, Godleski, and Gold.

2.4.1.4 Journal Club: In the upcoming academic year, we will use one of the other Friday time slots each month (not used for a work-in-progress seminar) for a Center-sponsored Journal Club. The Journal Club will be a forum for students, fellows, and investigators to keep up-to-date on air pollution research outside of the Center. Each Center investigator will lead at least one journal club meeting per year, for which s/he will select a paper to be discussed, and will lead the review. Dr. Koutrakis will organize this effort.

2.4.2. Consortium of EPA Centers: We have participated in the Consortium of EPA Centers during the current Center period, and will continue to do so in our proposed Center. This Consortium attempts to ensure that research in each Center is coordinated with, complementary, and not redundant with that of other Centers. It also facilitates rapid dissemination of research findings and other information between Centers, the EPA, the rest of the scientific community, and the lay public.

To achieve these specific aims, the Consortium holds an annual meeting open to all investigators from all Centers and EPA scientists. These meetings are hosted on a rotating basis by the individual Centers. There is a planning committee for each Consortium meeting that includes representatives from each Center, which defines a set of research questions to be addressed at the meeting. Center investigators present recent results or current research activities which are relevant to these pre-defined questions. There is also a meeting of the Center Directors only, to coordinate research activities and discuss issues common to all the Centers. Through the Consortium, the EPA Centers have established linked sites on the World Wide Web to provide descriptions of current research programs, downloadable copies of research reports and publications, and access to extended summaries and original data. We plan to continue contributing to these efforts in our proposed Center.
In addition, our Center Director will continue to participate in the frequent Center Directors' teleconferences. These provide a forum for discussing administration, collaborative research, and new initiatives. During our current Center period, working with other Centers we also used these teleconferences to prepare reports and publications describing the overall work of the Centers.

2.5. Center Integration Plan: A strength of the proposed Center is that it will capitalize on academic relationships that have been formed over the years between Harvard-based investigators. All projects and cores of this proposal are physically based within the Harvard Medical Area. The Harvard School of Public Health (Projects 1, 2, 5 and all Cores), Beth Israel Deaconess Medical Center (Project 3), and Brigham and Women’s Hospital and Children’s Hospital (Project 4) are all located within a few city blocks of each other, an advantage that will continue to facilitate the close and synergistic working relationships between Center teams that have contributed strongly to our current Center's productivity. Our collaborators on Projects 2, 3 and 4 are also located within the Boston area and will continue to meet readily with other Project research teams for discussion and interactions. This will also contribute to the highly interdisciplinary nature of our proposed Center, which includes scientists and investigations in fields including air pollution monitoring and exposure assessment, engineering, toxicology, epidemiology, and biostatistics. Within the Harvard Medical Area, Center Investigators based in these different locations and disciplines have close contact and interact on an almost daily basis and are continually discussing ongoing Center research, both informally and at meetings scheduled for specific purposes. Our Working Group weekly meetings (see 2.4 above) exemplify such close and productive interactions. In this connection, a recently-considered move of the Harvard School of Public Health to the Allston Harvard Campus is now on indefinite hold, and will not occur during the proposed Center period.

Because our Center teams enjoy such strong local connections and resources, we anticipate that internal integration will continue to thrive naturally within and outside of structured meetings, representing a tangible strength of our Center. By involving our local and outside collaborators in participation and integration into our working group, our Center will continue to exploit the unique advantages of their expertise and to create new opportunities for extension of their interests into environment issues. Project 5 includes Dr. Michelle Bell of Yale University as a co-investigator. For all meetings, facilities will be available for her participation by telephone or video conferencing. To assure that this internal integration continues and progresses, we will formally prioritize the continuation of our weekly working group meetings, and regular participation in work-in-progress seminars and journal club meetings will be required for continued Center funding of Investigators, Projects and Cores. The Center Director and Deputy Director will have responsibility for assuring that these activities are productive, cross-fertilizing among Projects and Cores, and multidisciplinary, engaging the full range of key personnel and expertise involved in our Center research.

2.5.1 Center Research Coordination, Decision-Making, and Monitoring Outcomes and Outputs: A key aspect of the ongoing and proposed Center is our planned continual evaluation of research needs and priorities. To achieve this goal, during our current Center we have implemented a rigorous, multi-phased research coordination and evaluation process. The process draws on experts from a wide range of disciplines at the Harvard School of Public Health and also from experts from outside agencies, universities, and other organizations. This mechanism
will continue to enable our Center to provide the most focused and timely responses possible to current and evolving questions about health effects of airborne pollution. Specifically, experts from four internal and external groups will contribute to the research coordination and evaluation process and will determine the direction and coordination of air pollution research that is conducted at the Center. These groups include: 1) the External Science Advisory Committee; 2) the Consortium of EPA Centers; 3) the Working Group on Exposures and Health Effects; and 4) the Center Steering Committee.

Numerous external factors have in the past impacted our Center research activities, and these serve to illustrate factors that may similarly affect our proposed Center research. For example:

- Research findings from other EPA Centers and research groups;
- Research recommendations from national and international panels (e.g., the National Research Council committee);
- Scientific disputes on important PM issues which may impact rule-making; and
- Comments from our peers about our research through direct contact or through conventional peer review processes and our Science Advisory Committee.

Our programmatic decisions will be based on several criteria, including: scientific progress of the research, relevance, innovation, opportunities, leveraging, scientific value, and timing. We will continue to use a two-step process for making needed adjustments to our research activities. First, we seek consensus among the Center Investigators through the Steering Committee. Second, we seek the opinion and consent of the Center Science Advisory Committee. We believe that between our own highly qualified group of investigators and the external advisors we are able to make appropriate decisions regarding the future direction of the Center.

Any decision to terminate an existing project, partially or entirely, is inherently challenging. A project may be terminated or modified for different reasons, such as: successful completion; lack of productivity; lack of human or material resources, or a need to divert resources and focus attention on new areas of engagement. EPA Centers are dynamic entities which may adjust their research portfolios as needed. As an existing Center, we have used this flexibility to terminate some research projects. For example, we terminated the Bus Project of our last Center based on our internal view of the difficulty to carry out this project the recommendation of our Science Advisory Committee, and directed resources to the NAS project which was then pursuing new genetic directions, resulting in a series of high-quality publications and leading to the present fully-developed new Project proposal (Project 2).

On the other hand, the decision process for initiating a new project is exciting because researchers always generate new ideas which they would like to pursue. However, resource availability and relevance of the proposed project to the mission of the Center need to be carefully addressed prior to committing to any such new research activity. In the past, we initiated the Toxicological Evaluation of Realistic Emissions of Source Aerosols (TERESA): Application to Coal-Fired Power Plant-Derived PM$_{2.5}$, which was not included in our original Center proposal. To maximize our capabilities in the face of limited available funds, we were able to attract co-sponsorship for this study by the Electric Power Research Institute (EPRI). This investigation warranted inclusion of the TERESA approach in a small project in our last center,
and has become the focus of the toxicological studies in our current proposed Center. The process for the initiation of this study was straightforward. First the idea was discussed among the Center PIs, and then it was presented to our Science Advisory Committee, which approved the idea.

2.5.2 Achieving results in a timely manner: Each Project and Core will be expected to present new research findings at annual national and international scientific meetings, to present significant advances at the annual Science Advisory Committee meeting, and to generate new peer-reviewed publications as evidence of achieving results. The Center Director and Deputy Director will monitor this progress. If a Project or Core is not able to show evidence of significant advancement through presentations and publications, the Center Director may redirect funds or terminate the project following the multi-phase process outlined above (Section 2.5.1).

2.6. Center Communications and Dissemination: We will prioritize the effective dissemination of our Center's research findings and other information as mission-critical. Our publication of research findings in scientific journals represents the "gold standard" for scientific acceptance and productivity, enabling Center leadership and the scientific community alike to objectively gauge the quality and productivity of our research. In addition, we will fulfill the larger need to communicate Center research findings in a way that is accessible to the lay community, policymakers, and other non-scientists. We will also participate in public discussion of Center research through presentations and testimony before regulatory and governmental agencies and boards. Accordingly, our Center will communicate its research findings through scientific publications, presentations, the Center Website, progress reports, and other available forums.

2.6.1. Scientific Publications: Our Center's primary form of dissemination will continue to be through peer-reviewed publications of original scientific research. During our EPA Center's current and preceding funding periods, we have achieved a record of high productivity, with 191 published articles. In addition to original research, the Center investigators have published three reviews and commentaries supported by the Center.

Our publications record shows a record of steady increase, as we published more papers during our current Center than during our preceding Center despite the latter's strong productivity (see Figure). This reflects not only the lag time inherent to a startup venture, but also our continued ability to attract and leverage new and interdisciplinary collaborations, cross-fertilize, adopt productive strategies and pursuits, and other synergies embodied in our Center. We anticipate that this trend of increasing productivity will continue during the proposed Center, maximizing EPA's and the public’s investment in our program.
2.6.2. **Center Website:** A key component of our outreach and dissemination effort will be to maintain, update and periodically upgrade or expand our current PM Center's website (http://www.hsph.harvard.edu/epacenter/). Our current website describes the Center's research and other activities, and provides many useful resources for researchers, students, policymakers, and interested taxpayers and members of the general public. The website provides complete html- or downloadable-pdf postings of the Center Abstract, Overview, all current Projects and Cores, our Progress Reports, Investigators, Science Advisory Committee members, upcoming seminars, and a link to all Center-supported published scientific articles. We will provide a "hot link" to each article, so the full text can be viewed by users. Our website will also continue to provide links to EPA websites, to other EPA Centers, and to other institutional and external agencies and institutions for information on air pollution health effects research and policy. We will continue to add new relevant resource links to our website as appropriate.

In addition we will provide a monthly synthesis of new results in layman's language, including the "hot links" to the corresponding publications. Also, as on our current website, we will post a calendar of upcoming public research seminars sponsored by the Center.

2.6.3. **Presentations:** In addition to formal publication of research results, our Center investigators will communicate key findings at annual scientific conferences. Dr. Koutrakis was an invited speaker at Gordon Conference at New Hampshire, August 2009, and Dr. Godleski gave a major presentation at the 2009 International Society for Aerosols in Medicine Conference, was keynote speaker at the August 2009 meeting of the Brazilian Society of Cardiology, and did a half hour public television program in Brazil on cardiovascular effects of air pollution. Dr. Schwartz was a featured speaker in a scientific symposium on Obesity and Asthma at the American Thoracic Society meeting in 2009. Dr. Mittleman chaired a special session on cardiovascular effects of air pollution at the American Heart Association’s Scientific Sessions in 2009, and he will be an invited plenary speaker at the American Heart Association’s Annual Meeting on Epidemiology and Prevention in San Francisco in March 2010. Dr. Gold was an invited speaker at the International Society for Environmental Epidemiology International
Meeting, August 2009, in Dublin, Ireland. In the last three years, Dr. Dominici has received three prestigious awards for her research in air pollution. These include the Myrto Lefkopoulou Distinguished Lectureship Award, the Gertrude Cox Award given by the Washington DC Chapter of the American Statistical Association and RTI International and the Mortimer Spiegelman Award given by the Statistics Section of the American Public Health Association. There were 21 presentations from our Center at the 2008 American Thoracic Society Meeting and 19 presentations at the 2009 American Thoracic Society meeting in San Diego. There were presentations specifically acknowledging current Center support at the recent International Society of Environmental Epidemiology Meeting and at the International Society of Exposure Assessment Meeting. We will also participate in the annual Consortium of EPA Center Investigators' meetings and other Center organized public meetings. The calendar on the Center website will list upcoming presentations at scientific conferences and public meetings by Center investigators.

Members of our Biostatistics Core have worked to integrate knowledge on recently developed statistical methods for PM research across Centers. In 2006, we organized a two-day workshop “Statistical Methods for PM Research”, as part of the annual EPA PM Centers Directors Meeting, held in Boston. This was a national workshop, with attendees from the nation's five PM Centers, other universities, and the EPA. The EPA asked the organizers of each subsequent PM Centers Meeting to include a breakout session on statistical methods. Our Center Investigators have helped organize these subsequent sessions each year. Biostatistics Core members also participated in an EPA workshop on statistical methods for multi-pollutant research (December 2006), and Drs. Coull and Koutrakis presented at a National Academies of Science (NAS) workshop on exposure measurement error (March 2008). These examples illustrate both the outreach made possible through our Center, and the high regard in which Center investigators' research is viewed by scientific peers. We will continue our efforts in this area.

2.6.4. Progress Reports: The Center will provide annual progress reports and a final report to EPA at the end of the grant period, and will post such reports on the Center website for outreach and ready public access. Project summaries and final results will be provided in a format compatible with broader efforts to compile and synthesize the large amounts of information on air pollution health effects. In addition, the proposed Center will cooperate with the other EPA Centers in the production of an integrated, interim report of progress midway through the grant cycle and a joint final report of findings at the conclusion of the grant.

REFERENCE