NATIONAL CENTER FOR ENVIRONMENTAL RESEARCH
ORD'S EXTRAMURAL GRANTS PROGRAM
Science to Achieve Results (STAR)

The National Center for Environmental Research (NCER) is the primary source of support for extramural research in the Office of Research and Development (ORD). The goal of NCER is to support high-quality research by the nation's leading scientists and engineers that will improve the scientific basis for national environmental decisions, thereby protecting human health and the environment. NCER supports leading-edge, extramural research in each of these areas through competitions for grants, fellowships, and innovative small business research contracts.

NCER's extramural research is conducted principally through the Science to Achieve Results (STAR) program. STAR is a competitive, rigorously peer-reviewed program of research grants that solicits proposals from scientists at universities and nonprofit institutions in response to targeted Requests for Applications (RFAs) issued by NCER. These grants support both individual investigator research and multi-disciplinary research grants and centers. Several solicitations are posted each year, resulting in about $60 million in grants annually.

What are the areas of emphasis in the STAR Air, Climate, and Energy (ACE) Research program?

The STAR ACE is a combination of the air pollution and global change research programs. These two programs have funded research on air pollution origins, measurements, transformations and its health effects. For the last decade, almost half of the STAR air pollution research program has been dedicated to funding interdisciplinary particulate matter (PM) research centers largely devoted to understanding the health effects associated with PM exposure.

A brief history leading to the new Clean Air Research Centers Program

In establishing the new National Ambient Air Quality Standards for PM in 1997, EPA and its Clean Air Scientific Advisory Committee agreed on the importance of expanding research programs to address the key issues in the PM criteria and standards review. In 1998 Congress urged EPA to establish as many as five university-based research centers focused on PM. In 1999, EPA funded five centers to address uncertainties in the science associated with health effects of exposure to PM. The first PM Centers RFA was designed to solicit research in the following areas: exposure, dosimetry and extrapolation modeling, toxicology and epidemiology. The Centers made substantial progress in this area and the highest priority questions for PM shifted from whether PM could be responsible for such adverse health effects to what sources and attributes of PM (e.g., size fraction, chemical components, etc.) were primarily responsible for different health outcomes.

The second round of PM Centers, funded in 2005, emphasized the central theme of "linking health effects to PM sources and components," and focused on the research priorities of susceptibility, biological mechanisms, exposure-response relationships, and source linkages. Details of the 2005 Centers can be found at http://www.epa.gov/ncer/science/pm/slides/.

In the fall of 2008, EPA requested a second review of the PM Research Centers program by the EPA's Science Advisory Board. The SAB recommended that future research centers balance a continued focus

on PM and other single pollutant research with new efforts to address mixtures of air pollutants. This single pollutant research, the panel emphasized, should also be conducted in a multipollutant context. Consequently, the new Clean Air Rresearch Centers (CLARCs) will research health effects of exposure to PM, ozone, and other air pollutants, both singly and in multipollutant atmospheres. The CLARCs will take an integrated approach to their study designs. In promoting integrated multidisciplinary research, EPA looked for CLARC applicants that demonstrate the team had worked together to conceive the design of the program, to ensure each project reflects the input of different disciplines and the influence of one on another, and that the Center as a whole reflects the collective thinking of a multidisciplinary team.

What related research is funded under the STAR program?

NCER funds a broad range of research through extramural grants (http://www.epa.gov/ncer). However, there are several research areas that are closely related to the Air Research program and as such, NCER staff coordinate in planning RFAs and monitoring research results.

- The Human Health program funds research related to improving human health risk assessment in areas such as exposure assessment, biomarkers, genetic susceptibility, and asthma. Together with NIH, the Human Health program funds several centers of excellence for Children's Environmental Health research.
- The Global Change program includes a major focus area exploring the impact of global change on air quality. The projects underway include research linking global models to regional air quality models, forecasting plausible emission scenarios for 50-100 years into the future, and improving models for important emission sources likely to significant change over the next century.
- The Nanotechnology program supports research on the environmental implications of nanotechnology, including toxicity, exposure, transport, and transformation of manufactured nanomaterials.
- The Small Business Innovative Research Program (SBIR) was created to strengthen the role of small businesses in federally funded research and development and develop a stronger national base for technical innovation. The SBIR program has addressed issues related to air pollution measurement and control.

Additional ACE research areas for STAR include the following:

- **A prospective epidemiological study as part of MESA-Air** to examine the health effects of long-term exposure to PM. The investigators will study the effects of exposure to air pollution on 8700 people aged 50-89 prospectively for ten years. This is the largest research grant ever funded by EPA, and it is a joint effort with the National Institutes of Health's National Heart, Lung, and Blood Institute (NHLBI). The majority of the study population and medical examinations are included through the NHLBI Multi-Ethnic Study of Atherosclerosis. The air pollution study, known as MESA-Air, will provide new and critically important information on the role of PM and other air pollutants in cardiovascular disease and mortality.

- **Atmospheric science** studies focused on measurement and modeling methods, with a special emphasis on understanding the sources of carbonaceous particulate matter and improving information to inform the development of air quality models and emissions inventories.

- ***Health Effects Institute:*** Together with the Office of Air and RadiationOAR, NCER co- funds the EPA grant with the Health Effects Institute (HEI). A key partner in PM research, HEI is an independent, nonprofit corporation chartered in 1980 to provide high quality, impartial, and relevant science on

the health effects of environmental pollutants. Supported jointly by EPA and industry, HEI has funded over 170 studies and has published more than 100 research reports and several special reports. Particulate air pollution is identified as a priority in the HEI strategic plan, and this public/private partnership has made significant advances in PM-related research. HEI has worked closely with the epidemiology community to solidify its database and analyses of large urban studies (e.g., the National Morbidity, Mortality, and Air Pollution Study) as well as to provide opportunities for investigations of health (mechanisms), statistics (general additive models used in epidemiology), and effects of changing technology (e.g., diesel engines). An internal EPA coordination committee representing all of the ORD labs and centers, as well as representatives from the Office of Air and Radiation, facilitates communication between EPA and HEI concerning research priorities and direction. The research supported by HEI is highly relevant to the mission of EPA's air quality programs and complements EPA's in-house PM Research program.

Summary of Selected RFA Topics Recently Funded in the Air and Global Programs

2007: Sources and Atmospheric Formation of Organics Particulate Matter

- **Seven projects aimed at improving the understanding of formation of secondary organic aerosol and how this process is represented in air quality models**

2007: Innovative Approaches to Particulate Matter Health, Composition, and Source Questions

- **Four projects combine ground and satellite measurements with regional air quality models to improve exposure assessment in epidemiologic analysis**

2008: Adaptation for Future Air Quality Analysis and Decision Support Tools in Light of Global Change Impacts and Mitigation

- **Eight projects integrate planning for air quality with changes in climate policies, transportation infrastructure, land use, and wildfires**

2008: Climate Change and Allergic Airway Disease

- **Three projects to improve measurement of pollens, and understanding of how pollen concentrations and the related health effects will change under future climate scenarios**

2009: Novel Approaches to Improving Air Pollution Emissions Information

- **Twelve projects will improve understanding of emissions from the transportation sector, ammonia from animal operations, and coarse particulate matter. Work will also new strategies for updating and improving emissions inventories.**

Grants Coming Soon in 2011:

- **Exploring New Air Pollution – Health Effects Links in Existing Datasets**
  - **New projects will use existing data sets to investigate new health endpoints and disparate impacts on susceptible subpopulations and across regions.**

- **Black Carbon's Role In Global To Local Scale Climate And Air Quality**
  - **New projects investigate the emissions, atmospheric aging, and modeling of black carbon and its impacts on radiative forcing, clouds, and air quality.**

- **Developing the Next Generation of Air Quality Measurement Technology**
  - **New projects will enable projects aimed at developing and demonstrating a range of new measurement techniques.**

RFA's Now Open for Solicitation:

- **Dynamic Air Quality Management**

  CLOSING: April 28, 2011, 11:59:59 pm Eastern Time

  The STAR program is seeking applications proposing research to lay the scientific foundation for improving the air quality management system. Applications may address increasing the rate at which new information is incorporated into regional and local air quality management or improving management of short-term air pollution episodes.

- **Extreme Event Impacts on Air Quality and Water Quality with a Changing Global Climate**

  CLOSING: April 18, 2011, 11:59:59 pm Eastern Time

  The STAR program, is seeking applications proposing the development of assessments, tools and techniques, and demonstration of innovative technologies for providing information and capacity to adequately prepare for climate-induced changes in extreme events in the context of air and water quality management. A goal of this RFA is to seek a better understanding of the hazards (the extreme events) and to establish ways for climate scientists, impact assessment modelers, air and water quality managers, and other stakeholders to co-produce information necessary to form sound policy in relation to extreme events and their impact on air and water quality under a changing climate.