Science to Achieve Results (STAR)
1999 Environmental Research Grants Competition
Opening Date: February 17, 1999

U.S. Environmental Protection Agency (EPA), Office of Research and Development (ORD), invites research grant applications in the following five areas of special interest to its mission.

1. Airborne Particulate Matter Health Effects: Closing Date: June 2, 1999
2. Drinking Water: Closing Date: May 19, 1999
3. Combustion Emissions: Closing Date: May 19, 1999
4. Computing Technology for Ecosystem Modeling: Closing Date: May 12, 1999
5. Exploratory Research: Closing Date: June 23, 1999

This invitation provides relevant background information, summarizes EPA's interest in the topic areas, and describes the application and review process.

To find current STAR research grantees in these areas go to:
http://www.epa.gov/ncerqa/grantlist.html

Background

This Request for Applications (RFA) describes programmatic areas which are a part of the EPA STAR (Science to Achieve Results) 1999 solicitation. Additional program topic areas and joint programs with the National Science Foundation and other agencies will be announced separately.

EPA Mission and R & D Strategy

The mission of EPA is to protect both environmental quality and human health through effective regulations and other policy initiatives. Achievement of this mission requires the application of sound science to assessment of environmental problems and to evaluation of possible solutions. A significant challenge is to support both long-term research that anticipates future environmental problems as well as research that fills gaps in knowledge relevant to meeting current Agency goals. Requests for Applications issued by the STAR Program are an important mechanism for promoting a sound scientific foundation for environmental protection.

EPA's research programs focus on reduction of risks to human health and ecosystems and on the reduction of uncertainty associated with risk assessment. Through its laboratories and through grants to academic and other not-for-profit institutions, EPA promotes research in both domains, according the highest priority to those areas in which risk assessors are most in need of new concepts, methods, and data. EPA also fosters the development and evaluation of new risk reduction technologies across a spectrum, from pollution prevention through end-of-pipe controls to remediation and monitoring. In all areas, EPA is interested in research that recognizes issues relating to environmental justice, the concept of achieving equal protection from environmental and health hazards for all people without regard to race, economic status, or culture.

EPA's extramural research grant program, the STAR Program, is administered by ORD's National Center for Environmental Research and Quality Assurance (NCERQA). The individual topic areas are discussed below.

RESEARCH TOPICS

1. AIRBORNE PARTICULATE MATTER HEALTH EFFECTS

Background

In 1996, EPA's Particulate Matter (PM) Criteria Document, which was peer reviewed by the Clean Air Scientific Advisory Committee (CASAC), concluded that there is increasing scientific confidence, based on numerous epidemiological studies, that PM is associated with increased morbidity and mortality, and that these associations occur at concentrations below the National Ambient Air Quality Standards (NAAQS) for PM in effect at that time. In July 1997, in addition to retaining the PM_{10} NAAQS, EPA published a new NAAQS for PM smaller than 2.5 micrometers (µm) in diameter, called $PM_{2.5}$, to provide increased protection against a wide range of PM-related health effects. In establishing these standards, both EPA and CASAC agreed on the importance of expanding research programs to address the key issues raised in the PM criteria and standards review.

In fiscal year (FY) 1998 Congress urged EPA to establish as many as five university-based research centers focused on PM and provided additional funding to expand PM research efforts. In addition, Congress asked EPA to arrange for an independent study by the National Academy of Sciences, National Research Council (NRC) to develop priorities for a comprehensive PM research plan, develop a near- and long-term PM research program, and monitor research progress over the next five years. On March 31, 1998, the NRC released its first report entitled ***Research Priorities for Airborne Particulate Matter: 1. Immediate Priorities and Long-Range Research Portfolio***. The NRC recommendations for PM research areas are shown in the Table. In the first

quarter of 1999, the second report by the NRC is anticipated to further characterize the highest priority PM research needs. The recommendations from the March 31, 1998, NRC report were used as a major source of guidance for the development of this RFA. The March 31, 1998, NRC report can be obtained by consulting **http://www.nas.edu** on the Internet. When completed early in 1999 the next NRC report is expected also to be available at this Internet site.

National Research Council PM Research Portfolio Recommendations for 1999

NRC Research Area

1. Outdoor measures vs. actual human exposures
2. Exposure of susceptible subpopulations to toxic PM components
3. Source-receptor measurement tools
4. Application of methods and models
5. Assess hazardous PM components
6. Dosimetry: deposition and fate of particles in the respiratory tract
7. Combined effects of PM and gaseous copollutants
8. Susceptible subpopulations
9. Mechanisms of injury
10. Analysis and measurement

In FY 1999 Congress again provided additional funding to expand PM research efforts. ORD is aligning the expanded PM research program to respond to the recommendations of the NRC. Based on recommendations from the NRC report and earlier strategic assessments, ORD is developing and implementing an integrated research program for PM which includes in-house studies, interagency research, PM Research Centers and RFAs through which scientists may compete for investigator-initiated grant awards.

The Agency is now reviewing proposals to develop PM research centers. The PM Research centers were solicited to construct well-defined and integrated programs that address PM research needs in the areas of exposure, dosimetry and extrapolation modeling, toxicology, and epidemiology. As the Agency develops an integrated research portfolio, the PM centers are anticipated to address some, but not all, research needs. Research supported in response to the present RFA is anticipated to complement the PM Centers and thereby assure that the full range of research needs is addressed. It is anticipated that additional research in the areas of exposure, toxicology, clinical studies and epidemiology focused on the topics identified in this RFA will be needed to address the research portfolio recommended in the March 31, 1998, NRC report.

Through the use of EPA-provided funding, State and local agencies are establishing an extensive and multi-level network of ambient air monitoring sites including mass

monitoring (including regulatory gravimetric monitors), continuous mass monitoring, and chemical speciation sampling and analyses. EPA has been working and will continue to work with State and local agencies to design these networks to provide maximum support for assessing relevant health effects, exposure assessment, atmospheric modeling, and regulatory requirements, including comparisons with the health and welfare-based NAAQS. EPA intends to supplement the data collected by these State and local agency-operated networks by initiating the "Super-sites" program. The Super-sites program will provide additional information on the chemical and physical properties of fine particles that will be used by both the research and regulatory communities.

Data collected through this monitoring network provides a valuable opportunity for the research community, including research funded through this RFA.. Researchers responding to this RFA are encouraged to leverage these data collection activities, and other PM monitoring programs, where appropriate. To support leveraging and coordination of research and monitoring efforts, a detailed description of the status and scope of the PM monitoring program data collection activities is attached as an appendix (Description of Ambient PM Monitoring Network).

RESEARCH PRIORITIES

The March 31, 1998, NRC report recommended a portfolio of activities targeted to address the highest priority PM research needs. To develop an optimal portfolio, the Agency has evaluated the NRC research priorities, considered the activities already underway to address priority needs (an initial research inventory is contained in the NRC report), determined the appropriate areas of focus for PM Research Centers, and for this RFA. Through this RFA, the Agency is soliciting proposals to support research in the areas of toxicology, clinical studies, and epidemiology.

Described below are priority research topics for this solicitation. Toxicological and clinical research is generally relevant to assessment of hazardous PM components, effects of PM and copollutants on health, and toxicity mechanisms. Epidemiological research (including associated human exposure research) is generally relevant to the first two of these areas, though present uncertainties over the causative PM agents suggest short-term studies, e.g., panel studies, are preferred for the purposes of this solicitation. Exposure research is integral to epidemiological studies and is supported for the purposes of this solicitation insofar as it supports epidemiological studies. The March 31, 1998, NRC report suggests that major new epidemiological studies not be initiated in the first years of this program, but be delayed until the information on personal exposure and toxicological mechanisms would be available. Similarly the NRC report recommends that future human exposure studies, focused on susceptible sub-populations, be undertaken as more is known of biologically important constituents. Applicants are encouraged to consult the March 31, 1998, NRC report for additional elaboration of these priority research topics.

Assessment of Hazardous PM Components

Particulate pollution is a complex mixture of organic and inorganic compounds which exists over a wide range of sizes and whose composition can vary widely depending on the time of year and geographical location. Epidemiological studies have typically used particle size as the metric for identifying associations with adverse population-level effects, largely because data on PM size is available while data on particle composition or other characteristics are less well known, if known at all. Nevertheless, several properties or components of PM have been postulated to be responsible for increased mortality/morbidity. Recently, 11 plausible PM causative constituents and properties were listed at the EPA/NARSTO PM workshop held in Chapel Hill, NC on July 22-23, 1998 (PM Measurements Report, available from the Health Effects Institute, 955 Massachusetts Avenue, Cambridge, MA 02139). EPA and others are conducting a significant research effort in examining three of these eleven plausible PM causal constituents, namely metals, organics and biogenics/bioaerosols. ***Research is especially encouraged to evaluate other constituents and properties of PM (e.g., ultrafine PM, acids, sulfate and nitrate salts, peroxides, soot) employing toxicological, clinical and epidemiological approaches.*** (The EPA/NARSTO workshop list of plausible PM causal constituents and properties may not be exhaustive; thus, identification and evaluation of alternative characteristics is included in this need).

Reducing uncertainties in the identification of causative PM is of great importance to PM health risk assessment. The objective of this research is to understand the role of physicochemical characteristics of PM in eliciting adverse health effects. Research is needed:

- To develop and use particulate matter surrogates for use in controlled exposure studies;

- To assess relevant dose metrics for particulate matter (e.g., particulate mass, number, surface area, composition, concentration-time relationships) to explain adverse health effects;

- To evaluate the role of particle size (e.g., ultrafine versus fine versus coarse) in the adverse health effects associated with ambient air PM exposure;

- To determine the role of PM chemistry and biological characteristics in toxicological responses to PM that relate to epidemiological health outcomes.

Combined Effects of PM and Gaseous Copollutants

Particulate matter in ambient air exists in a mixture that includes co-pollutants such as ozone, sulfur oxides, nitrogen oxides, carbon monoxide, and hazardous air pollutants. The composition and characteristics of the PM and surrounding atmosphere, both in the ambient air and in micro-environments affecting personal

exposure, change over space and time as a function of temperature, moisture content, and source contributions, among other factors. Relatively little toxicological and clinical research is now underway to understand the combined effects of PM and gaseous copollutants; thus, this is an area of significant need. Epidemiological and exposure studies generally consider the influence or presence of some copollutants, though monitoring data heretofore have been scarce to support such evaluations. With the advanced ambient measurements anticipated through the EPA and state/local agency monitoring efforts (see appendix), opportunities exist to better understand the role of ambient air PM and copollutants in producing effects. ***The objective of this research should be to disentangle the effects of particulate matter from the effects of other pollutants and to better understand the effects of exposure to PM in the presence of other pollutants.*** Research is needed:

- To understand the potential for PM independently and in combination with other pollutants to affect the deposition, target tissue dose, and response of the lung and related systems;

- To understand the role of PM independently and in combination with other pollutants in epidemiological findings associating PM exposures with health outcomes.

Mechanisms of Injury

Elucidation of the mechanisms by which PM might produce toxicity consistent with observed epidemiological findings of increased illness and mortality is important to support more confident risk management decisions. Substantial efforts are now underway at EPA and elsewhere to explore potential cardiopulmonary mechanisms of PM toxicity, including development of cardiopulmonary disease models. However, insufficient research is underway to explore alternative hypotheses. Research is especially encouraged to develop and evaluate novel hypotheses on the mechanistic basis of PM toxicity from the molecular through physiologic levels. Research is especially needed to explore neurologic, systemic, and direct cardiac responses to PM. Development of linkages between ambient, emission, and surrogate PM characteristics also are needed to help relate mechanistic results to epidemiological findings. ***The objective of this research is to understand the underlying mechanisms of toxicity that can explain the epidemiological findings of adverse effects associated with exposure to ambient PM.*** Research is needed:

- To identify the molecular and physiological mechanisms by which ambient air PM mediates adverse health effects;

- To identify potential health conditions that would enhance susceptibility to adverse PM health effects and how host susceptibility factors influence the dose-response relationship;

- To understand the biological mechanisms associated with enhanced susceptibility

to adverse PM health effects.

Special Requirements

When appropriate, in conducting its research the grantee must demonstrate a willingness to take advantage of existing or future air quality data bases, especially relating to $PM_{2.5}$, as they become available.

Funding: It is anticipated that a total of approximately $5 million, including direct and indirect costs, will be awarded in FY 1999-2000, depending on the availability of funds. Proposals may request funding for projects with a total cost up to $200,000/year with a duration of up to 3 years.

APPENDIX: Description of Ambient PM Monitoring Network

In 1998, the Agency focused its efforts on establishing the first mass measurement sites. The continuous mass monitoring, chemical speciation, and Super-sites monitoring programs are undergoing initial deployment in 1999. The basic design of the fine particulate network includes approximately 1000-1100 gravimetric mass measurement sites. Most of these (900-1000) are or will be located in metropolitan areas, their suburbs, or other cities where people are expected to live, work, and be outdoors. Special emphasis is given to heavily populated areas and areas where high particulate levels are expected. Among these population-oriented sites, one-fourth will sample every day, one-fourth will sample once every six days, and the remaining sites will sample once every three days. The remaining 100 gravimetric mass measurement sites will be located in areas where background and pollutant transport data can be collected. These sites will operate once every three days.

Each metropolitan area with a population greater than one million is required to have continuous monitoring as part of its network (52 cities currently fit this category; i.e., the 52 metropolitan areas in the country with the largest population will have continuous monitoring). Although the design decisions for this part of the network are being completed in 1999, EPA and State and local agencies expect that the additional continuous mass monitoring will be implemented at minimally 100 sites nationwide (decisions on the location of the remaining 48 or more sites have not been made).

The chemical speciation program, including the objectives and design of both the routine chemical speciation sites and the Super-sites program, is being reviewed by the Clean Air Scientific Advisory Committee's (CASAC) Fine Particulate Matter Monitoring Subcommittee. The current approach toward designing the chemical speciation program includes establishing approximately 50 sites for long-term trends and data assessments, another 250 sites for more routine chemical speciation assessments, including those necessary to support regulatory activities and related studies, and the Super-sites program which will establish more advanced speciation and measurements at 4-8 locations. The sampling frequency (once every three days for 40 sites; daily for 10 sites), methodology, operating procedures, and analyses for the 50 trends sites (see EPA's chemical speciation guidance plan for site locations at http://www.epa.gov/ttn/amtic/) will be established by EPA with input from the CASAC scientific review. At this time, we assume for planning purposes that most of the 250 additional routine chemical speciation sites will operate once every six days. However, the design of these networks is the responsibility of State and local agencies which are expected to tailor their chemical speciation programs to address air quality issues reflecting local and regional phenomena. Accordingly, the sampling approaches are likely to vary across the nation, and include for example advanced instrumentation capable of capturing aerosol components in-situ over near continuous time scales. Furthermore, it will be imperative that those working within the Super-sites program coordinate their efforts with the State and local agencies operating routine monitors in the same airsheds. The methodology, sampling frequency, location, and other technical aspects of the Super-sites program will vary depending upon the objectives outlined with each Super-sites program proposal. The initial Super-sites locations are Atlanta and Fresno/Bakersfield. Planning for these sites is now underway with deployment anticipated in the summer of 1999. Decisions on the other Super-sites are anticipated in late 1999.

Another supplement to the chemical speciation data collected at the State and local agency-operated sites and the Super-sites, is the data collected by the Interagency Monitoring of Protected Visual Environments (IMPROVE) program. One hundred IMPROVE sites are expected to be deployed in federal Class 1 areas (e.g., wilderness areas). The IMPROVE sampling technique is a multi-filter based method that will provide speciated data on fine particulates.

EPA's Aerometric Information Retrieval System (AIRS) will contain information on each State and local agency's air pollution monitoring networks including their network design and siting conditions, lists of pollutants measured at each site, ambient air concentrations, and basic statistical information. For more information on the AIRS, access the Internet site http://www.epa.gov/airsdata/. Information on EPA's regulatory monitoring program is accessible through the Internet: **http://www.epa.gov/ttn/amtic/.** For additional information on EPA's plans on the PM networks, please contact: Richard Scheffe (919-541-4650) or Lee Byrd (919-541-5367). For additional information on the interface of research and monitoring efforts, please contact John Vandenberg (919-541-4527) or Jim Vickery (919-541-2184).

2. DRINKING WATER

The Safe Drinking Water Act mandates that EPA identify and regulate drinking water contaminants which may have adverse health effects and which are known or anticipated to occur in public water systems. EPA regulations addressing requirements of the Act require disinfection of surface water and certain groundwater supplies. Scientific evidence suggests that exposure to chemical byproducts formed during the disinfection process may be associated with adverse health effects. Reducing the amount of disinfectant or altering the disinfection process may decrease byproduct formation; however, these practices may increase the potential for microbial contamination. EPA's current challenge is to balance the health risks caused by exposure to microbial pathogens with the health risks caused by exposure to disinfection byproducts. EPA is also required under the Safe Drinking Water Act to publish a list of contaminants which may be subject to regulation.

Emerging Contaminants from the Contaminant Candidate List

The Safe Drinking Water Act (SDWA) Amendments of 1996 require EPA to publish a list of contaminants which, at the time of publication, are not subject to any proposed or promulgated national primary drinking water regulation (NPDWR), are known or anticipated to occur in public water systems, and may require regulations under the SDWA [section 1412(b)(1)]. The 1996 Amendments specify that EPA must publish the first list of contaminants ("Contaminant Candidate List," or CCL) not later than 18 months after the date of enactment, i.e., by February 1998, and every five years thereafter. The Amendments also specify that the CCL must be published after consultation with the scientific community and after notice and opportunity for public comment. The Drinking Water CCL was published on March 2, 1998, and will help establish priorities for the future of EPA's drinking water program. The list is comprised of contaminants that are known or anticipated to occur in public water systems. Contaminants are grouped according to drinking water research (health treatment/analytical methods); occurrence monitoring; and regulatory or guidance development, including health advisories. The Agency is required to select five or more contaminants from this list and determine whether to regulate them by August 2001. Regulations must be proposed by August 2003 and be set by February 2005. The contaminant identification and selection cycle repeats every five years, and every six years EPA will re-evaluate existing regulations.

Method Development Research for Contaminant Candidate List Microorganisms

Background: The current contaminant list includes 10 microorganisms (Federal Register 63(40):10274-10287, March 2, 1998). In an assessment of current knowledge regarding different aspects of the ten microorganisms (health effects, occurrence in source water and drinking water, and treatment), nine of these microorganisms were identified as currently lacking adequate analytical methods. These organisms are listed below (not in any rank or order):

Caliciviruses (Norwalk and Snow Mountain viruses)
Coxsackieviruses
Echoviruses
Mycobacterium avium complex
Helicobacter pylori
Adenoviruses (especially serotypes 40 and 41)
Cyanobacteria and toxins (six species, microcystin LR and other toxins)
Aeromonas hydrophila
Microsporidia (***E***. ***bieneusi*** and ***E***. ***septata***)

For only one of these microorganisms (***Aeromonas***) is there a method that is suitable for a monitoring program. Detection methods for the other microorganisms are in differing stages of development. Some of the listed microbes are already the focus of ongoing or planned research efforts to develop or improve analytical methods, e.g. caliciviruses, ***Mycobacterium avium*** complex, coxsackieviruses and echoviruses, and cyanobacteria and toxins.

Some obvious areas where additional research is needed were identified and are listed below as areas of particular priority; however, EPA will favorably consider proposals that take new or innovative approaches to analytical method development for any microorganisms listed above***.*** In general, any analytical method for the above microorganisms should ideally be capable of detecting the specific microorganism in turbid natural water and be able to demonstrate its viability or infectivity. Low cost and rapid analysis are also desirable characterisitics.

The highest priority areas where method development is needed are listed as follows:

- Improved methods for detecting and enumerating ***Helicobacter pylori*** in microbiologically contaminated natural water (e.g., development of selective growth medium).

- Improved methods to detect viable adenovirus (e.g., evaluate currently available cell lines for their ability to support enteric adenovirus growth or develop a new suitable cell line).

- Development of all or parts of analytical methods for human microsporidia (e.g., improved capture and separation method, specific methods to detect microsporidia species known to infect humans, new methods to determine infectivity of such species).

- Molecular methods or other practical approaches to rapid and low cost detection of viable waterborne viruses.

- Improved methods to recover and separate viruses and/or protozoa from turbid natural water samples and from large volume (approximately 1000L) drinking water samples.

Cryptosporidium parvum:

Recent research has shown that humans are infected by various strains and genotypes of ***Cryptosporidium parvum*** and that there are differences in infectivity, virulence, and immune response. Questions have also been raised in recent research on differentiation of species and the possibility that species other than ***C. parvum*** could infect humans. In order to better understand the impact on the human population of ***C. parvum*** oocysts in drinking water, information is needed on the relative importance of different strains and/or genotypes in terms of disease burden in humans and prevalence in non-human host species that may transmit waterborne disease. Information on human infectivity of other species of ***Cryptosporidium*** is also needed.

Disinfection Byproducts

Treatment Techniques for Removing DBP Precursors:

There is a great deal of research underway that addresses granular activated carbon, nanofiltration, and enhanced coagulation as treatment techniques for removing disinfection byproduct precursors. Research is needed on other processes that are more cost-effective for removing a large percentage of disinfection byproduct precursors (>50%). It would be desirable to use a matrix of different waters to demonstrate the applicability of the technology on a national scale. Cost effectiveness for both small and large treatment systems is important.

Brominated DBPs:

Most DBP precursor removal technologies (e.g., GAC, membranes, enhanced coagulation) preferentially remove TOC over bromide, thereby increasing bromine incorporation in DBPs. Research is needed to expand our understanding of the relationship between bromide, TOC, UV-254, and chlorine residual on the speciation of DBPs. Secondary parameters that will affect speciation include pH, temperature, and reaction time.

Human Exposure:

To effectively evaluate the risks associated with the DBPs and to establish adequately protective health-based criteria and subsequent regulatory standards, total exposure to each chemical needs to be considered. Assessments of dietary ingestion exposures, inhalation exposures, and dermal exposures for the general population are important in order to understand their contribution to overall exposure, thus providing for a comprehensive risk characterization and enabling the establishment of protective health criteria. Besides tap water, there are other sources of DBPs (e.g., swimming pools, commercial food sanitation/preservation). Research is needed to determine the extent to which these other sources contribute to dermal, inhalation, and ingestion exposure. Identification and characterization of the most highly exposed and chemically susceptible subpopulations is also needed.

It is recognized that there are many other problems in assuring a safe drinking water supply to the public which this solicitation cannot address. EPA anticipates additional solicitations in the future which will focus on some of these.

Funding: Approximately $5.0 million is expected to be available in fiscal year 1999 for awards in this program area. However, awards are subject to the availability of funds. The projected award is up to $175,000/ year with a duration of 2 or 3 years.

3. COMBUSTION EMISSIONS

BACKGROUND: Combustion facilities for hazardous or other wastes include hazardous waste incinerators, furnaces and boilers, and municipal incinerators. The risks associated with emissions from combustion facilities are potentially high, because of the large number of these facilities, their potential to emit very toxic contaminants (such as dioxins, furans, mercury, lead, and cadmium), the potential dispersion of these contaminants over large areas, and exposures across multiple pathways. In addition, risks are often perceived to be very high by the public and surrounding communities. Some constituents and processes have already been identified as significant risk factors and are the subject of major research and regulatory efforts. For example, mercury and dioxin are the subject of several research and regulatory programs, and there are research programs focused on other major source categories such as utilities and chlor-alkali plants. Many other constituents, such as products of incomplete combustion (PICs), have not been fully identified nor their risks sufficiently characterized, and therefore regulatory standards for these constituents often rely on control technologies intended to collectively reduce the level of such contaminants.
PURPOSE: The purpose of this solicitation is to invite research on topics that will supplement current understanding of risks posed by the emission of contaminants from hazardous waste incinerators and combustion facilities. Applications must not duplicate research being solicited under other research programs, e.g., mercury, nor focus on medical waste incinerators.

Identification of Potential Risks and Improvements to Risk Analysis Capabilities

Research is needed to improve our understanding of indirect exposure pathways, including the transport, transformation, and environmental fate, of combustion contaminants, focusing especially on contaminants not already receiving priority attention. Which contaminants, such as co-planar PCBs, brominated aromatic hydrocarbons, and metals like arsenic, are most likely to reach and pose risks to receptors of concern?

Approaches for identifying and prioritizing which contaminants are of the most potential concern may include:

- Develop data and information (including where available existing field measurements) to identify contaminants of potential concern, and suggest methodologies for identifying exposure pathways and receptors of concern;

- Further characterize the organic portion of the emissions profile, focusing on more refined approaches for identifying and quantifying these compounds;

- Develop improved fate, transport, and transformation models of contaminants that are emitted from waste combustion facilities, focusing especially on developing improved models for vapor-particle partitioning of semi-volatile organics, vapor transport to surfaces, wet and dry deposition, and surface vapor uptake in plants;

- Develop approaches and/or conduct validation of individual model components, including field validation;

- Develop methodologies to estimate the risks of cumulative continuous exposures from multiple combustion facilities and other sources of contaminants, and derive mathematical factors to apply in risk analyses to address cumulative risks from multiple sources.

Funding: It is anticipated that a total of $1 million will be awarded in FY 1999-2000, depending on the availability of funds. Proposals may request funding for projects up to $125,000/ year with a total cost up to $375,000, with a duration up to 3 years.

4. INFORMATION AND COMPUTING TECHNOLOGY FOR MULTI-DISCIPLINE ECOSYSTEM MODELING

The Environmental Protection Agency's Computing, Information, and Communications Research and Development (CIC R&D) program is an integral part of a research strategy to improve human health and ecosystem risk management. The CIC R&D program promotes research to improve multi-disciplinary ecosystem modeling, risk assessment, and environmental decision making through the advancement and use of information technologies and scalable computing.

In the past, computational limitations and a single discipline approach to environmental assessment ignored the importance of cross media effects. Numerous independent models and other software tools are available that deal with segregated aspects of the environment. This includes air and water quality, air-water surface exchange, hydrology, hydrodynamics, sedimentation, subsurface flow, bioaccumulation, ecology, and risk assessment. An integrated, expandable approach is needed to facilitate the evolution toward more comprehensive assessment tools made up of a large number of interoperable components and distributed data stores.

The major direction for topics under this solicitation is provided by EPA's research strategy (http://www.epa.gov/ORD/WebPubs/final/). This strategy is focused on the scientific information required to measure, model, maintain, and/or restore, at multiple scales, the integrity and sustainability of ecosystems now and in the future. This approach is supported by the recommendations in the August 1998 President's Information Technology Advisory Committee Interim Report (http://www.ccic.gov/ac/interim/).

Objectives and priorities: EPA's STAR program is seeking proposals aimed at developing high performance information and computing technologies for use in ecosystem assessment and management. Proposals are solicited from individuals or groups for research that is inherently multi-disciplinary within the environmental field including computer science expertise. The main areas of interest are:

- problem solving environments with object-oriented and/or component-based software design for cross-media ecosystem simulation,

- data management and manipulation associated with preparation of data for use in multi-scale ecosystem simulation and analysis/synthesis of simulation results for problem resolution,

- techniques for representation of earth surface and subsurface characteristics, and

- scalable parallel algorithm development for subsurface geohydrologic modeling.

This research is intended to promote the development of problem solving

environments for ecosystem management. All technological advances should be demonstrated in a results-oriented prototype that specifically addresses cross-media ecosystem management capabilities that support community-based environmental assessments.

Problem Solving Environments for Ecological Simulation

Problem solving environments (PSE) provide a broad range of computational capabilities to address a specific class of problems. This enables inexperienced people to accomplish tasks they could not have done otherwise and assists experienced people to accomplish more difficult tasks more rapidly. This research targets the exploration of the technology required to facilitate software reuse, data sharing, and spatial modeling and decision support within the context of ecosystem management. Without software reuse it is not practical for one group to build the complex software needed for cross-media ecosystem applications. The very structure of the problem may change as scale, level of resolution, or granularity changes. The development of meaningful simulations that combine disparately structured models into new types of simulations is critical. Proposals should address one or more of the following objectives:

- Methods for high-level specification of interoperable ecosystem simulation components and/or objects, evolution of components over time, and management and reliable integrated use of ecosystem simulation components.

- Object-oriented and/or component based modeling and simulation of complex spatial ecosystem and ecological phenomena at multiple scales.

- Reusable object-model-based class libraries for parallel numerical solvers and science processes related to cross-media exchanges, uncertainty, and risk assessment.

Data Management, Access, and Analysis Techniques

A wealth of environmental data from diverse sources at multiple scales exists and continues to accumulate each day. Scientists need techniques to access, manipulate, and merge data to support ecosystem simulation. Policy makers, industry, and the general public have diverse needs for data access, manipulation, summarization, and interpretation. Intelligent and effective methods are needed to satisfy the extensive need for environmental data to support environmental management activities. Proposals should address one or more of the following research areas:

- Standardized data structures allow cross-media ecosystem models to be executed in parallel across networks. This includes knowledge-based methods to gather, store, query, retrieve, manipulate, and merge complex spatial and temporal cross-discipline ecosystem data at varying scales for direct use in spatial ecological

simulations including data compression techniques, metadata handling, and geospatial data manipulation.

- Scalable parallel input-output (I/O) for querying, analyzing, and integrating vector, point, and raster data and both regular and irregular grid systems. This includes data assimilation techniques supported by high performance I/O mechanisms for data reordering, aggregation, interpolation, and remapping; fast queries over distributed databases and archives. Proposals should also consider I/O for binary large objects to enable the integration of diverse multi-scale data, particularly those associated with remote sensing, into predictive models to enhance the quality of model predictions.

- Multivariate analysis and visualization techniques including visualization over three dimensional space and time, and techniques for desktop virtual environments for analysis of time sequences of three dimensional environmental data.

Techniques for Representation of Earth Surface and Subsurface Characteristics

The movement of water and dissolved solutes, such as nutrients and chemical stressors, through a watershed is strongly influenced by the spatial distribution of surface features (vegetation, rivers, topography) and subsurface geologic heterogeneities. Thus, reliable prediction of stressor transport through the hydrologic cycle depends on accurate depiction of spatially-distributed surface and subsurface properties. The focus of this research area is development of classification, computational, and visualization techniques to support the theoretical and practical construction of heterogeneous representations of the earth surface and subsurface for use in cross-media ecosystem modeling.

A key component of any cross-media ecosystem model is a geologic characterization model capable of describing the variety of geologic architectures typically encountered in the subsurface, using fairly well-understood principles of geology. Significant advancements have been made in the classification of geologic architectures produced by depositional processes, such as in the classification of sedimentary geometries associated with fluvial depositional settings and the use of bounding surface order to characterize depositional scale hierarchies (for example, Miall, A.D., Principles of Sedimentary Basin Analysis, 1990).

This research is intended to stimulate the development of conceptual subsurface geologic characterization models. Specifically, proposals should address one or more of the following research areas:

- Methods to generate representations of geologic architectures over a watershed simulation domain;

- Approaches for populating geologic architectures with hydrogeologic parameters, according to the order of the bounding surfaces within each architectural element;

- Methods for integrating multivariate techniques of data analysis;

- Interactive visualization approaches for manual and knowledge-based ordering, rendering, and analyzing sets of geologic objects in three-dimensional space.

High performance algorithms for multi-scale subsurface geohydrologic modeling

The analytic element method (AEM) has been shown to be uniquely suited for modeling multi-scale subsurface flow in regional aquifers. The method employs the superposition of analytic functions to create an approximate, but analytic, solution to the regional groundwater flow problem (Strack, O.D.L, Groundwater Mechanics, Prentice Hall, 1989). The analytic functions are called "analytic elements", each of which represents some flow feature in the aquifer. For instance, a line sink is used to model a section of a stream, or inhomogeneity elements are used to enclose areas of variable hydraulic conductivity. The representation is approximate yet analytic, and therefore relatively insensitive to scale with minimal numerical dispersion. There is no discrete specification of the spatial domain, such as with a finite difference grid or finite element mesh. Regionally, a rather coarse representation of streams and lakes may be employed, while locally the hydrologic features can be represented in more detail in order to obtain the required model precision. In fact, three-dimensional solutions can be embedded in the regional Dupuit-Forchheimer model (horizontal flow) to further enhance the realism of the model in the area of interest. This flexibility in scale and model resolution makes the analytic element method efficient for modeling large regional aquifers.

Large regional models with much local detail require many analytic elements which all contribute to the flow. This leads to calculations to arrive at the head or flow vector at a point in the aquifer. The computational effort is particularly large when some of the analytic elements represent three-dimensional flow, like the one for a partially penetrating well. In principle, the AEM is very suitable for parallel processing as the evaluation of the head or the flow vector at a point involves many independent calculations that can be executed in parallel. Major advances are occurring in the use of higher-order elements, and the utility of iterative solvers.

The majority of analytic elements are harmonic functions, and thus may be represented as the real parts of analytic functions of a complex variable. The aquifer may be divided into a grid of square blocks, where the elements outside of each block may be lumped into a single Taylor series about the center of the block. Computation of the potentials (and thus heads and velocities) in each block is thus reduced to the evaluation of a few functions explicitly, with the majority of functions lumped into a single series, greatly increasing the speed of calculations inside of the block. Strack calls this the "superblock" approach. AEM techniques using superblocks have the potential to

make solution of regional flow problems including the local detail possible.

Proposals should address scalable and parallel algorithm development in one or more of the following research areas:

- Three-dimensional flow in unconfined aquifers, including point, line, and area element representation for wells, rivers, lakes, wetlands.

- Analytic solutions for unsaturated regional flow, and coupled unsaturated-saturated flow systems.

- Continuous, time-varying analytic solutions for subsurface flow, including the influence of storage, spatially and temporally varying recharge, and changing surface water elevations.

- Analytic solutions for dynamic stream flow generation, including rain event-driven base flow and the emergence of topographically-driven variable source areas.

- Variable density Dupuit flow in coastal aquifers, including improved formulations for the three-dimensional continuous density distribution.

- Flow in stratified and multi-layer aquifers of variable thickness and non-horizontal base elevation.

- Residence times of environmental tracers in ground-watersheds.

- Dispersion in heterogeneous aquifers and relation to geologic architectures.

- Hybrid techniques that take advantage of the strengths of the analytic element methods and the numerical methods, such as embedded finite difference techniques within analytic element models.

- Automated and facilitated inverse modeling for multi-layer aquifer simulation, through optimization and parameter estimation.

- Multi-scale modeling on distributed platforms, such as supra-regional scale “superblocks” solutions on the server, and local scale problem solving on the client.

Funding: Up to $3 million is expected to be available in fiscal year 1999 for awards in this program area. The projected award range is up to $300,000/year for up to 3 years. Software and algorithms developed under these grants shall be made available to the public at the end of the grant period.

5. EXPLORATORY RESEARCH

To support the mission of EPA to protect human health and the environment, the Agency must have a base of sound science. Research conducted under the STAR program is an important mechanism for promoting a sound scientific foundation for environmental protection. One of the approaches under STAR to build this foundation is the issuance of requests for applications (RFAs) in targeted areas of research that address particular gaps in science or engineering knowledge that have been identified. A second approach is to allow open, investigator-initiated projects which apply new, novel, and highly innovative approaches to address environmental issues or the scientific or engineering principles that underlie them. This latter approach is the subject of this solicitation.

Our objective in this announcement is to support innovative, and possibly high risk, research that may help define and understand significant environmental problems emerging in the future and describe approaches to addressing current problems requiring more innovative solutions. This solicitation is seeking novel approaches that can lead to significant breakthroughs which provide enhanced environmental benefit.

Applications which are more appropriately responsive to other 1999 NCERQA RFAs may not be submitted to this competition and will not be considered..

SCOPE

In this announcement, we are requesting applications in the areas of environmental physical sciences and engineering. (In future years, we anticipate requesting applications in the area of environmental biology in alternate years to solicitations in physical sciences and engineering.) The current solicitation addresses all areas of environmental chemistry, physics, and engineering. Research may be considered "high risk" or deal with fundamental principles, but should lead to creative or innovative solutions to significant high risk environmental problems. Applications should describe the nature and significance of the environmental issue being targeted, along with the nature and expected benefits of the proposed research in leading to a solution to that issue or significantly advancing the understanding of the science that underlies it.

Examples of possible areas of research are suggested below. These are for guidance only; other environmental problems and novel approaches to those problems may be addressed. The examples are:

- Study of reaction mechanisms and reaction products between naturally occurring organic matter (e.g., humic substances) and chemical oxidants.

- Methods for preventing or treating persistent, bioaccumulative, and toxic substances, particularly when known approaches are ineffective or of high cost, e.g.:

- Identification of innovative and efficient approaches for removal of mercury from coal and waste combustion gases.

- Removal or detoxification of substances such as mercury, arsenic, and PCBs from soils, sediments, and groundwater.

- Alternatives to use of highly reactive chromium in plating operations.

- Methods to detect and map non-aqueous phase liquids (NAPLs) in the subsurface and to monitor effectiveness of ***in-situ*** soil and groundwater treatment processes.

- Development of ***in-situ***, real-time monitors for detecting high toxicity chemicals or microbial contaminants in drinking water, surface waters, or air.

Although the volume and technical content of applications may require that more than one peer review panel be utilized for review, please understand that all applications responding to the exploratory physical sciences and engineering solicitation will be judged in competition against each other. Interdisciplinary proposals are encouraged. However, to help EPA organize the set of technical review panels that may be required, applicants should indicate whether the research rests most appropriately in the area of engineering (R1), chemistry (R2), or physics (R3) (see Sorting Codes section below).

Funding: Approximately $3 million is expected to be available in FY1999-2000 for new exploratory research grants. The project award range is $75,000 to $125,000/year for up to 2 years. Awards are subject to the availability of funds.

ELIGIBILITY

Academic and not-for-profit institutions located in the U.S., and state or local governments, are eligible under all existing authorizations. Profit-making firms are not eligible to receive grants from EPA under this program. Federal agencies, national laboratories funded by federal agencies (FFRDCs), and federal employees are not eligible to submit applications to this program and may not serve in a principal leadership role on a grant.

FFRDC employees may cooperate or collaborate with eligible applicants within the limits imposed by applicable legislation and regulations. They may participate in planning, conducting, and analyzing the research directed by the principal investigator, but may not direct projects on behalf of the applicant organization or principal investigator. The principal investigator's institution may provide funds through its grant from EPA to a FFRDC for research personnel, supplies, equipment, and other expenses directly related to the research. However, salaries for permanent FFRDC employees may not be provided through this mechanism.

Federal employees may not receive salaries or in other ways augment their agency's appropriations through grants made by this program. However, federal employees may interact with grantees so long as their involvement is not essential to achieving the basic goals of the grant.[1] The principal investigator's institution may also subcontract to a federal agency to purchase unique supplies or services unavailable in the private sector. Examples are purchase of satellite data, census data tapes, chemical reference standards, analyses or instrumentation not available elsewhere, etc. A written justification for federal involvement by subcontract must be included in the application, along with an assurance from the federal agency involved which commits it to supply the specified service.

> ***[1]EPA encourages interaction between its laboratory scientists and grant principal investigators for the purpose of exchanging information in research areas of common interest that may add value to their respective research activities. However, this interaction must be incidental to achieving the goals of the research under a grant. Interaction that is "incidental" is not reflected in a research proposal and involves no resource commitments.***

Potential applicants who are uncertain of their eligibility should contact Dr. Robert E. Menzer in NCERQA, phone (202) 564-6849, EMail: menzer.robert@epamail.epa.gov

STANDARD INSTRUCTIONS FOR SUBMITTING AN APPLICATION

This section contains a set of special instructions on how applicants should apply for an NCERQA grant. Proposed projects must be for research designed to advance the state of knowledge in the research areas described in this solicitation.

Sorting Codes

In order to facilitate proper assignment and review of applications, each applicant is asked to identify the topic area in which their application is to be considered. **It is the responsibility of the applicant to correctly identify the proper sorting code.** Failure to do so will result in an inappropriate peer review assignment. At various places within the application, applicants will be asked to identify this topic area by using the appropriate Sorting Code. The Sorting Codes correspond to the topic areas within the solicitation. The Sorting Codes and application deadlines for this solicitation are shown below:

Topic Area	Sorting Code	Due Date
AIRBORNE PARTICULATE MATTER HEALTH EFFECTS	99-STAR-M1	June 2, 1999
DRINKING WATER		
CCL MICROORGANISMS	99-STAR-C1	May 19, 1999
DISINFECTION BYPRODUCTS	99-STAR-C2	May 19, 1999
COMBUSTION EMISSIONS	99-STAR-P1	May 19, 1999
COMPUTING TECHNOLOGY FOR ECOSYSTEM MODELING	99-STAR-Q1	May 12, 1999
EXPLORATORY RESEARCH - Engineering	99-STAR-R1	June 23, 1999
Chemistry	99-STAR-R2	June 23, 1999
Physics	99-STAR-R3	June 23, 1999

The Sorting Code must be placed at the top of the abstract (as shown in the abstract format), in Box 10 of Standard Form 424 (as described in the section on SF424), and should also be included in the address on the package that is sent to EPA (see the section on **How to Apply**).

The Application

The initial application is made through the submission of the materials described below. **It is essential that the application contain all the information requested and be submitted in the formats described.** If an application is considered for award, (i.e., after external peer review and internal review) additional forms and other information

will be requested by the Project Officer. **The application should not be bound or stapled in any way.** The Application contains the following:

A. **Standard Form 424:** The applicant must complete Standard Form 424 (see attached form and instructions). This form will act as a cover sheet for the application and **should be its first page**. Instructions for completion of the SF424 are included with the form. The form must contain the original signature of an authorized representative of the applying institution. Please note that both the Principal Investigator and an administrative contact should be identified in Section 5 of the SF424.

B. **Key Contacts:** The applicant must complete the Key Contacts Form (attached) as the **second page** of the submitted application.

C. **Abstract: The abstract is a very important document**. Prior to attending the peer review panel meetings, some of the panelists may read only the abstract. Therefore, it is critical that the abstract accurately describe the research being proposed and convey all the essential elements of the research. Also, in the event of an award, the abstracts will form the basis for an Annual Report of awards made under this program. The abstract should include the following information, as indicated in the example format provided:

1. **Research Category** and **Sorting Code:** Enter the full name of the solicitation to which your application is submitted and use the correct code that corresponds to the appropriate RFA topic. (Be sure to substitute the appropriate code for the "**XX**" in 99-STAR-**XX**).

2. **Title:** Use the exact title as it appears in the rest of the application.

3. **Investigators:** Start with the Principal Investigator. Also list the names and affiliations of each co-investigator who will significantly contribute to the project.

4. **Institution**: List the name and city/state of each participating university or other applicant institution, in the same order as the list of investigators.

5. **Project Period**: Provide the proposed project dates.

6. **Project Cost**: Provide the total request to EPA for the entire project period.

7. **Project Summary:** This should summarize: (a) the **objectives** of the study (including any hypotheses that will be tested), (b) the experimental **approach** to be used (which should give an accurate description of the project as described in the proposal), (c) the **expected results** of the project and how it addresses the research needs identified in the

solicitation, including the estimated improvement in risk assessment or risk management that will result from successful completion of the work proposed.

8. **Supplemental Keywords:** A list of suggested keywords is provided for your use. Do not duplicate terms already used in the text of the abstract.

D. **Project Description:** This description must not exceed fifteen (15) consecutively numbered (center bottom), 8.5x11-inch pages of single-spaced standard 12-point type with 1-inch margins. The description must provide the following information:

1. **Objectives**: List the objectives of the proposed research and the hypotheses being tested during the project and briefly state why the intended research is important. This section can also include any background or introductory information that would help explain the objectives of the study (one to two pages recommended).

2. **Approach**: Outline the methods, approaches, and techniques that you intend to employ in meeting the objective stated above (five to 10 pages recommended).

3. **Expected Results or Benefits**: Describe the results you expect to achieve during the project, the benefits of success as they relate to the topic under which the proposal was submitted, and the potential recipients of these benefits. This section should also discuss the utility of the research project proposed for addressing the environmental problems described in the solicitation (one to two pages recommended).

4. **General Project Information**: Discuss other information relevant to the potential success of the project. This should include facilities, personnel, project schedules, proposed management, interactions with other institutions, etc. (one to two pages recommended).

5. **Important Attachments**: Appendices and/or other information may be included but must remain within the 15-page limit. References cited are in addition to the 15 pages.

The following sections are in addition to the 15-page Project Description.

E. **Resumes:** The resumes of all principal investigators and important co-workers should be presented. Resumes must not exceed two consecutively numbered (bottom center), 8.5x11-inch pages of single-spaced standard 12-point type with 1-inch margins for each individual.

F. **Current and Pending Support:** The applicant must identify any current and pending financial resources that are intended to support research related to that included in the proposal or which would consume the time of principal investigators. This should be done by completing the appropriate form (see attachment) for each investigator and other senior personnel involved in the proposal. Failure to provide this information may delay consideration of your proposal.

G. **Budget:** The applicant must present a detailed, itemized budget for the entire project. This budget must be in the format provided in the example (see attachment) and not exceed two consecutively numbered (bottom center), 8.5x11-inch pages with 1-inch margins. Please note that institutional cost sharing is not required and, therefore, does not have to be included in the budget table. However, if you wish to cost-share, a brief statement concerning cost sharing can be added to the budget justification. If cost-sharing is proposed, the estimated dollar amounts should be included in the appropriate categories in the budget table.

H. **Budget Justification**: This section should describe the basis for calculating the ***personnel***, ***fringe benefits***, ***travel***, ***equipment***, ***supplies***, ***contractual support***, and ***other*** costs identified in the itemized budget and explain the basis for their calculation (special attention should be given to explaining the ***travel***, ***equipment***, and ***other*** categories). This should also include an explanation of how the indirect costs were calculated. This justification should not exceed two consecutively numbered (bottom center), 8.5x11-inch pages of single-spaced standard 12-point type with 1-inch margins.

I. **Quality Assurance Narrative Statement:** For any project involving data collection or processing, conducting surveys, environmental measurements, and/or modeling, or the development of environmental technology (whether hardware-based or via new techniques) for pollution control and waste treatment, provide a statement on how quality processes or products will be assured. This statement should not exceed two consecutively numbered, 8.5x11-inch pages of single-spaced standard 12-point type with 1-inch margins. This is in addition to the 15 pages permitted for the Project Description. The Quality Assurance Narrative Statement should, for each item listed below, either present the required information or provide a justification as to why the item does not apply to the proposed research. For awards that involve environmentally related measurements or data generation, a quality system that complies with the requirements of ANSI/ASQC E4, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs," must be in place.

1. The activities to be performed or hypothesis to be tested (reference may be made to the specific page and paragraph number in the application

where this information may be found); criteria for determining the acceptability of data quality in terms of precision, accuracy, representativeness, completeness, comparability. (Note: these criteria must also be applied to determine the acceptability of existing or secondary data to be used in the project.)

2. The study design, including sample type and location requirements and any statistical analyses that were used to estimate the types and numbers of samples required for physical samples or similar information for studies using survey and interview techniques.

3. The procedures for the handling and custody of samples, including sample identification, preservation, transportation, and storage.

4. The methods that will be used to analyze samples or data collected, including a description of the sampling and/or analytical instruments required.

5. The procedures that will be used in the calibration and performance evaluation of the sampling and analytical methods used during the project.

6. The procedures for data reduction and reporting, including a description of statistical analyses to be used and of any computer models to be designed or utilized with associated verification and validation techniques.

7. The intended use of the data as they relate to the study objectives or hypotheses.

8. The quantitative and or qualitative procedures that will be used to evaluate the success of the project.

9. Any plans for peer or other reviews of the study design or analytical methods prior to data collection.

ANSI/ASQC E4, "Specifications and Guidelines for Quality Systems for Environmental Data Collection and Environmental Technology Programs" is available for purchase from the American Society for Quality Control, phone 1-800-248-1946, item T55. Only in exceptional circumstances should it be necessary to consult this document. There are EPA requirements (R-series) and guidance (G-series) documents available for potential applicants which address in detail how to comply with ANSI/ASQC E4. These may be found on the Internet at http://es.epa.gov/ncerqa/qa/qa_docs.html. R-5, "EPA Requirements for Quality Assurance Project Plans," and G-4, "Guidance for the Data Quality Objectives Process," are particularly pertinent to this RFA's QA requirements.

J. Postcard: The Applicant must include with the application a self-addressed, stamped 3x5-inch post card. This will be used to acknowledge receipt of the application and to transmit other important information to the applicant.

How to Apply

The original and ten (10) copies of the fully developed application and one (1) additional copy of the abstract (11 in all), must be received by NCERQA no later than **4:00 P.M. EST** on the closing date assigned to the topic area appropriate to the application (**see Sorting Codes section**):

The application and abstract must be prepared in accordance with these instructions. Informal, incomplete, or unsigned proposals will not be considered. The application should not be bound or stapled in any way. The original and copies of the application should be secured with paper or binder clips. Completed applications should be sent via regular mail to:

U.S. Environmental Protection Agency
Peer Review Division (8703R)
Sorting Code: 99-STAR-XX (replace the "XX" with the appropriate code)
401 M Street, SW
Washington DC 20460

For express mail or courier-delivered applications, the following address must be used:

U. S. Environmental Protection Agency
Peer Review Division (8703R)
Sorting Code: 99-STAR-XX (replace the “XX” with the appropriate code)
1300 Pennsylvania Avenue, NW
Room B-10105
Washington, DC 20004

Phone: (202) 564-6939 (for express mail applications)

The sorting code must be identified in the address (as shown above).

Guidelines, Limitations, and Additional Requirements

Proposals must be submitted to only one topic area, using a single sorting code. Proposals submitted to more than one RFA topic will be assigned to the topic designated on the first version received or to the first sorting code designated on the application. If you wish to submit more than one application, you must ensure that the research proposed is significantly different from any other that has been submitted to this solicitation or from any other grant you are currently receiving from EPA or any other federal government agency.

Projects which contain subagreements or subcontracts constituting more than 40% of the total direct cost of the grant for each year in which the subcontract is awarded will be subject to special review and may require additional justification.

Researchers will be expected to budget for and participate in an annual All-Investigators Meeting with EPA scientists and other grantees to report on research activities and to discuss issues of mutual interest.

Review and Selection

All grant applications are initially reviewed by EPA to determine their legal and administrative acceptability. Acceptable applications are then reviewed by an appropriate technical peer review group. This review is designed to evaluate each proposal according to its scientific merit. In general, each review group is composed of non-EPA scientists, engineers, social scientists, and/or economists who are experts in their respective disciplines and are proficient in the technical areas they are reviewing. The reviewers use the following criteria to help them in their reviews:

1. The originality and creativity of the proposed research, the appropriateness and adequacy of the research methods proposed, and the appropriateness and adequacy of the Quality Assurance Narrative Statement. Is the research approach practical and technically defensible, and can the project be performed within the proposed time period? Will the research contribute to scientific knowledge in the topic area of the solicitation? Is the proposal well-prepared with supportive information that is self-explanatory and understandable?

2. The qualifications of the principal investigator(s) and other key personnel, including research training, demonstrated knowledge of pertinent literature, experience, and publication records. Will all key personnel contribute a significant time commitment to the project?

3. The availability and/or adequacy of the facilities and equipment proposed for the project. Are there any deficiencies that may interfere with the successful completion of the research?

4. The responsiveness of the proposal to the research needs identified for the topic area. Does the proposal adequately address all of the objectives specified for this topic area?

5. Although budget information is not used by the reviewers as the basis for their evaluation of scientific merit, the reviewers are asked to provide their view on the appropriateness and/or adequacy of the proposed budget and its implications for the potential success of the proposed research. Input on requested equipment is of particular interest.

Applications that receive scores of excellent and very good from the peer reviewers are subjected to a programmatic review within EPA, the object being to assure a balanced research portfolio for the Agency. Scientists from the ORD Laboratories and EPA Program and Regional Offices review these applications in relation to program priorities and their complementarity to the ORD intramural research program and recommend selections to NCERQA.

Funding decisions are the sole responsibility of EPA. Grants are selected on the basis of technical merit, relevancy to the research priorities outlined, program balance, and budget. A summary statement of the scientific review by the peer panel will be provided to each applicant. Customarily, applicants are notified about award decisions within 6 months of the application deadline.

Applications selected for funding will require additional certifications, possibly a revised budget, and responses to any comments or suggestions offered by the peer reviewers. Project Officers will contact Principal Investigators to obtain these materials.

Proprietary Information

By submitting an application in response to this solicitation, the applicant grants EPA permission to share the application with technical reviewers both within and outside of the Agency. Applications containing proprietary or other types of confidential information will be returned to the applicant without review.

Funding Mechanism

The funding mechanism for all awards issued under this solicitation will consist of grants from EPA and depends on the availability of funds. In accordance with Public Law 95-224, the primary purpose of a grant is to accomplish a public purpose of support or stimulation authorized by Federal statute rather than acquisition for the direct benefit of the Agency. In issuing a grant agreement, EPA anticipates that there will be no substantial EPA involvement in the design, implementation, or conduct of the research funded by the grant. However, EPA will monitor research progress, based in part on annual reports provided by awardees.

Contacts

Additional general information on the grants program, forms used for applications, etc., may be obtained by exploring our Web page at **www.epa.gov/ncerqa**. EPA does not intend to make mass-mailings of this announcement. Information not available on the Internet may be obtained by contacting:

U.S. Environmental Protection Agency
National Center for Environmental Research and Quality Assurance (8703R)
401 M Street, SW
Washington DC 20460

Phone: 1-800-490-9194

In addition, a contact person has been identified below for each topic within the RFA. These individuals will usually be the Project Officers for the grants funded under a particular topic. They will respond to inquiries regarding the solicitation and can respond to any technical questions related to your application.

AIRBORNE PARTICULATE MATTER HEALTH EFFECTS

- Deran Pashayan 202-564-6913
  pashayan.deran@epamail.epa.gov

DRINKING WATER

- William Stelz 202-564-6834
  stelz.william@epamail.epa.gov

COMBUSTION EMISSIONS

- Thomas Veirs 202-564-6831
  veirs.thomas@epamail.epa.gov

COMPUTING TECHNOLOGY FOR ECOSYSTEM MODELING

- Chris Saint 202-564-6909
  saint.chris@epamail.epa.gov

EXPLORATORY RESEARCH

- Bala Krishnan 202-564-6832
  krishnan.bala@epamail.epa.gov