

EPA/600/R-95/002

February 1995



The United States  
Environmental Protection Agency



Announces  
the Availability of

**1995 Grants for Research**

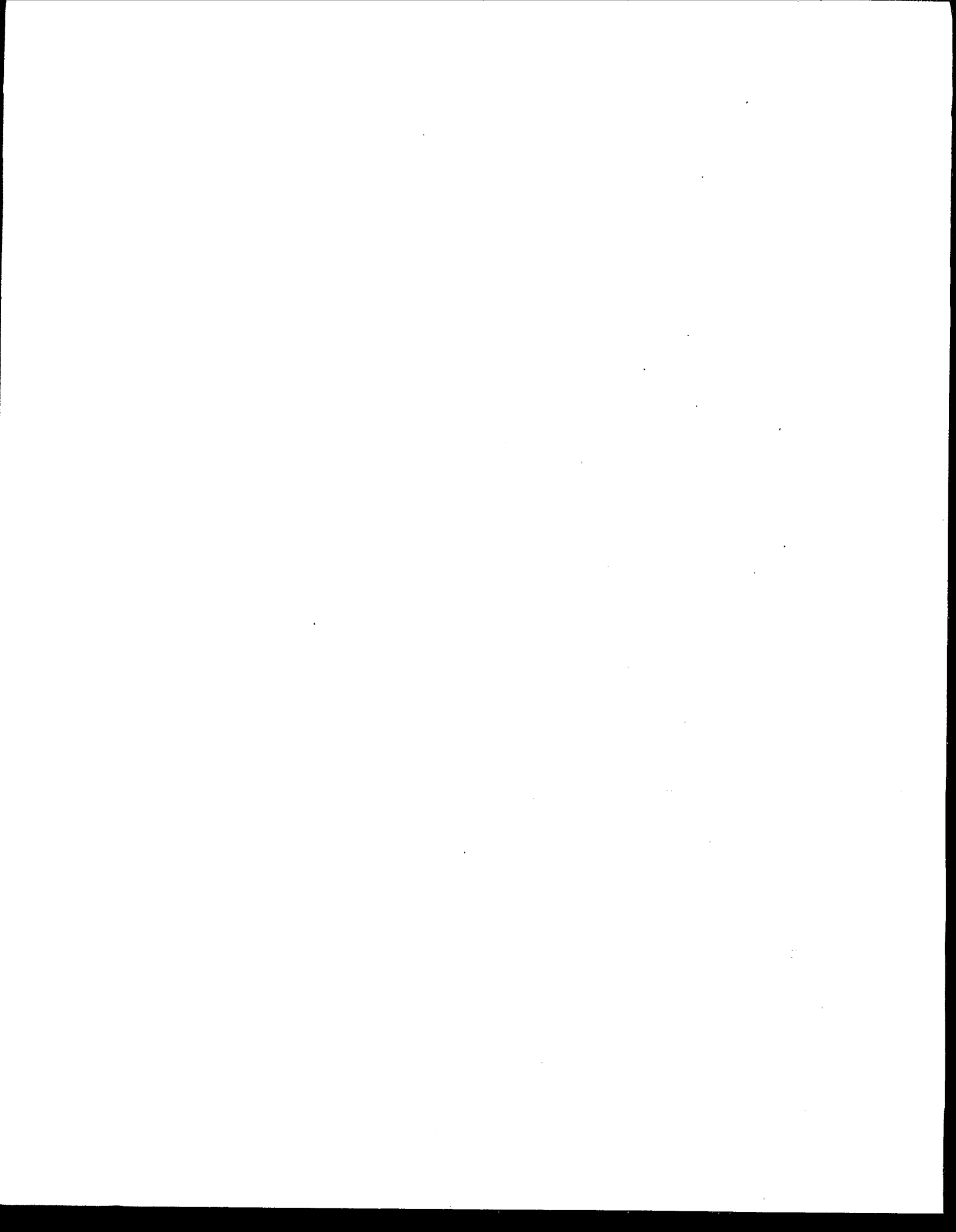
on

**Reducing Uncertainty in Risk  
Assessment and  
Improving Risk Reduction  
Approaches**

**APPLICATION SUBMISSION CLOSING DATE: APRIL 17, 1995**

Apply to:

U.S. Environmental Protection Agency  
Office of Research and Development  
Office of Exploratory Research (8703)  
401 M Street, SW  
Washington DC 20460



## Introduction

The U.S. Environmental Protection Agency (EPA) invites research grant applications in four areas of special interest to its mission:

- Human health risk assessment
- Indoor air quality in large office buildings
- Air pollutants (particulate matter, tropospheric ozone, and toxics)
- Regional hydrologic vulnerability to global climate change

This invitation provides relevant background information, summarizes EPA interests in the four topic areas, and describes the application and review process.

## Background

EPA has increased funding for its investigator-initiated research grants in fiscal year 1995. EPA therefore is issuing two additional Requests for Applications (RFAs), of which this is one. The other is a joint solicitation with the National Science Foundation (NSF) that identifies three areas of interest to both agencies—water and watersheds; valuation and environmental policy; and technology for a sustainable environment (pollution prevention).

Information on the NSF/EPA solicitation can be obtained by contacting Dr. Penny Firth at NSF, (703) 306-1480, or Dr. Melinda McClanahan at EPA, (202) 260-7474.

## EPA Mission and R&D Strategy

The mission of EPA—and its unique role—are the joint protection of environmental quality and human health through effective regulations and other policy decisions. Achievement of this mission requires the application of sound science to the assessment of environmental problems and evaluation of solutions. Moreover, a significant challenge is to support long-term research that anticipates future environmental problems and strives to fill significant gaps in knowledge relevant to meeting regulatory goals. This Request for Applications and the joint EPA/NSF solicitation are important steps toward ensuring that EPA is positioned to provide national leadership as the country enters a new generation of environmental protection.

EPA recently reorganized its research programs to focus on major areas of uncertainty associated with assessment and reduction of risks to human health and ecosystems. Through its laboratories and through grants to universities and other not-for-profit institutions, EPA will conduct and support research in the subject matter areas where regulatory officials face the most significant gaps in knowledge about environmental risks. Because risk is a function of both hazard and exposure, EPA will promote research in both domains—according highest priority to those areas where risk assessors are most in need of new concepts, data, and methods. At the same time, EPA will foster the development and evaluation of

new risk reduction technologies across a spectrum, from pollution prevention through end-of-pipe controls, to remediation and monitoring.

## Research Topics of Interest

### 1. Human Health Risk Assessment

As described in the recent NRC report entitled "Science and Judgement in Risk Assessment," EPA uses health risk assessments to establish exposure limits and set priorities for regulatory activities. However, EPA is hampered by gaps in methods, models, and data needed to support risk assessments. In many cases default assumptions are used to extrapolate from animals to humans, from high to low doses, from acute to chronic exposures, and from lowest effect levels to no-effect levels.

One of EPA's Office of Research and Development's major research goals is to reduce reliance on such assumptions. For example, EPA needs biologically and physiologically based predictive models that will provide new concepts, data, and methods that can replace default assumptions.

Research is needed on the following areas:

- Methods for estimating dose from cumulative human exposure (e.g., via air, water, soil, and food) to significant and persistent environmental contaminants. This research is intended to support evaluation of cumulative exposure and dose apportionment and to demonstrate the application of the methods developed to estimate human health risks.
- Principles governing age-dependent responses to environmental contaminants and to improve capabilities for animal-to-human extrapolation of health risks. Neurotoxicity is a priority response to be evaluated, but other end points will be considered.
- Quantitative toxicokinetic and toxicodynamic interactions among chemicals in environmental mixtures of members of chemical classes that are significant environmental contaminants (e.g., PAHs, halogenated solvents, metals, chlorinated dioxins and furans, PCBs, and pesticides).
- Toxicological interactions such as additivity, synergism, and antagonism in such mixtures. To improve the ability to estimate risks from environmental exposures, a priority is research that is focused on realistic exposures to environmental contaminants.
- Methods for quantifying noncancer risks, such as reproductive or developmental disorders. Of special interest are methods that are based on validated correlations between biochemical or physiological markers and clinical end points.
- Inter-individual and intra-individual variability in factors that affect susceptibility to toxicity from environmental contaminants. Further, research is needed to elucidate



relationships between such variability and disease outcome.

- Human and animal reproductive processes vulnerable to environmental contamination. This research is needed to identify keystone or sentinel species whose reproduction can be monitored to signal potential risk to other species, including humans.
- Major uncertainties in risk assessment for microbial pathogens in surface and drinking waters. For example, critical gaps in knowledge exist with respect to occurrence and levels of microbial waterborne pathogens, infectious dose, survival in the environment, and susceptibility to treatment processes.
- Other research areas as defined by proposers that contribute to the overall goals of this research topic.

Approximately \$3.0 million will be available from fiscal year 1995 funds. A typical project will be supported for a period of up to 3 years at \$150,000 per year.

## **2. Indoor Air Quality in Large Office Buildings**

The 1986 Superfund Amendments and Reauthorization Act (SARA) Title IV directs EPA to conduct and support research on indoor air quality. An important aspect of this research is improving the scientific understanding of, and reducing the uncertainties surrounding, the relationships among indoor air quality, human exposures, and large building design and operation.

Of interest are cross-sectional and/or longitudinal studies of large office buildings in relatively large geographical regions across the U.S. that characterize the relationships among the following:

- the physical, mechanical and environmental factors that influence indoor air quality;
- relevant human exposures to aerosols, microorganisms, volatile organic compounds, and other parameters such as air exchange rate and pesticides;
- the pathways through which these exposures occur;
- occupant perceptions of indoor air quality and occupant productivity;
- the extent to which human activity patterns, building system operating practices or design, and indoor or outdoor air quality affect these exposures; and
- other research areas as defined by proposers that contribute to the overall goals of this research topic.

To provide high quality data necessary for intra- and inter-building comparisons, minimum data requirements and analytical protocols must be the same or equivalent to those recommended in the following two documents: "A Standard-

ized EPA Protocol for Characterizing Indoor Air Quality in Large Office Buildings," (6/1/94) and "The United States Environmental Protection Agency's Large Building Studies Quality Assurance Overview Document," (11/1/94). Copies of these two documents can be obtained by contacting Ross Highsmith at (919) 541-3121, or pahl.dale@epamail.epa.gov.

Approximately \$1.5 million will be available from fiscal year 1995 funds. A typical project will be supported for a period of up to 3 years at \$150,000 per year.

## **3. Air Pollutants (Particulate Matter, Tropospheric Ozone, and Toxics)**

Certain widespread (criteria) air pollutants, such as ozone and particulate matter (PM), continue to pose serious public health risks for susceptible members of the U.S. population or risks to sensitive ecosystems. The Clean Air Act requires that EPA establish and periodically review and revise, as appropriate, criteria and National Ambient Air Quality Standards (NAAQS) for such pollutants. The Act also requires State Implementation Plans (SIPs) to be prepared, which describe control strategies that states and local authorities will employ to bring nonattainment areas into compliance with the NAAQS.

The EPA is seeking investigator-initiated grant proposals aimed at generating new knowledge to

- improve the scientific basis for future reassessment of the PM NAAQS;
- reduce uncertainties in SIP modeling projections for tropospheric ozone and measurement of the effectiveness of SIPs in meeting the ozone NAAQS;
- increase the understanding of transport and deposition of volatile and semivolatile toxic pollutants, and the ultimate exposure of humans and ecosystems to them; and
- other research areas as defined by proposers that contribute to the overall goals of this research topic.

Of particular interest in relation to the first area are projects that will provide information useful in resolving controversies regarding epidemiologic analyses that suggest associations between increased mortality and morbidity, and particulate matter concentrations markedly below the current particulate matter NAAQS, including

- improving quantitative estimates of particulate matter exposure;
- employing epidemiologic analyses that more directly estimate potential effects; and
- evaluating potential confounding variables (e.g., weather).

Possible approaches may involve, but are not restricted to, alternative biostatistical models, coupling existing or refined epidemiologic analyses to improved exposure data, case-control or cross-sectional studies of mortality, indices of morbidity, and/or biomarkers of effects. The relative roles of



fine versus coarse particles and of chemical composition are of particular interest.

Of interest in the second area is fundamental research in the atmospheric chemistry, modeling, emissions, and ambient measurement of tropospheric ozone contributing to strengthened control strategy development and improved assessment of SIP effectiveness, including the following:

- kinetic and mechanistic studies of gas-phase reactions involving aromatic volatile organic compounds (VOCs), biogenic VOCs, long-chain alkenes and alkanes that participate in ambient photochemistry, and studies on the link between ozone and heterogeneous or aqueous-phase reactions;
- studies to explore boundary layer turbulence and mixing and their interaction with atmospheric chemistry and studies of quantitative techniques for assessing the errors or uncertainties inherent in concentration estimates from ozone air quality modeling systems;
- studies of large-scale fluxes of biogenic emissions of VOCs and  $\text{NO}_x$  for different landscapes;
- studies that may lead to new techniques for ambient measurement, on short time scales, of chemically significant trace gases participating in the photochemistry of ozone; and
- both in-situ and remotely sensed studies of innovative methods for using ambient concentration and meteorological measurements in assessing the potential ozone response to local changes in precursor emissions/concentrations.

Of interest in the third area are projects that address compounds, including aerosols, semivolatile pollutants, and/or trace metals that travel through the air pathway, especially those that are persistent, mobile, or bioaccumulative. Also of interest are projects that investigate major uncertainties in

- transport and atmospheric phase equilibria;
- composition versus particle size;
- deposition to surfaces;
- food chain uptake from atmospheric deposition; and/or
- dermal exposure from atmospheric deposition.

Projects are encouraged that result in new or improved databases, algorithms, models, or modules for preexisting models that can be used by the scientific community in the analysis of transport and fate of air toxics; the quantification of air and air-deposition pathways; and the assessment of risks for air toxics.

Approximately \$2.5 million will be available from fiscal year 1995 funds. A typical project will be supported for a period of up to 3 years at \$150,000 per year.

#### **4. Regional Hydrologic Vulnerability to Global Climate Change**

Vulnerability research is a major responsibility of EPA's Global Climate Change Research Program. Understanding regional vulnerability to climate change is critically dependent on understanding how projected widespread climate change affects the hydrologic watershed at scales where water resources and related ecologic, economic, and sociopolitical impacts are manifested. To make informed decisions concerning the risks of global change, the public and policymakers need a better understanding of the hydrologic vulnerabilities of regional systems. This, in turn, requires improved methodologies that identify and quantify physical and economic regional vulnerabilities to competing hydrologic demands under current climate patterns and under projected climate-change scenarios.

Attempts to quantify these types of vulnerabilities have been hampered by the absence of techniques for performing regional analyses using projected climate change. These regional analyses should include both direct hydrologic response (e.g., soil moisture, streamflow, stream temperature) and secondary impacts on regional ecology and economics. Major sources of uncertainty in conducting regional hydrologic analyses are the sensitivities of regional hydrologic systems to changing climate and future demands for water. Accordingly, as part of EPA's interest in watershed research, this solicitation invites proposals that address climate change aspects of watershed hydrology in the following areas:

- Translation of climatic information into water availability (e.g., soil moisture and streamflow) and other ecologic variables as required by water resource and natural resource modelers.
- Linkage of water availability with water and natural resource response prediction.
- Linkage with economic activities in various sectors (e.g., agriculture and forestry) competing for the water resources, and associated feedbacks.
- Other research areas as defined by proposers that contribute to the overall goals of this research topic.

This solicitation seeks proposals that may include a range of innovative research approaches, from modeling to data analysis and observational and experimental approaches, singly or in combination. Proposals are encouraged without regard to specific location of any proposed hydrologic regional setting but should reflect the goal to reduce uncertainties in watershed hydrology as influenced by concerns about vulnerabilities to climate change.

Approximately \$1.0 million will be available from fiscal year 1995 funds. A typical project will be supported for a period of up to 3 years at \$150,000 per year.

## The Application

Proposed projects must be research-designed to advance the state of knowledge in the indicated areas of environmental science and technology. Applications will not be accepted for routine monitoring, state-of-the-art or market surveys, literature reviews, development or commercialization of proven concepts, or for the preparation of materials and documents, including process designs or instruction manuals.

Application forms and instructions are available in the EPA Research Grants Application Kit. Interested investigators should review the materials in this kit before preparing an application for assistance. The kits can be obtained at the following address:

U.S. Environmental Protection Agency  
Office of Research and Development  
Office of Exploratory Research (8703)  
401 M Street, SW  
Washington DC 20460  
(202) 260-7474

Each application for assistance must consist of the Application for Federal Assistance Forms (Standard Forms — SF 424 and 424A), separate sheets that provide the budget breakdown for each year of the project, the resumes for the principal investigator and co-workers, the abstract of the proposed project, and a project narrative that includes a quality assurance narrative. All certification forms (e.g., lobbying certification) must be signed and included with the application.

The closing date for application submission is April 17, 1995, at 4:00 P.M. EST.

To be considered, the original and eight copies of the fully developed research grant application, prepared in accordance with instructions in the Application for Federal Assistance Forms, must be received by the EPA Office of Exploratory Research no later than the above closing date. Informal, incomplete, or unsigned proposals will not be considered. Completed applications should be sent via regular or express mail to

U.S. Environmental Protection Agency  
Office of Research and Development  
Office of Exploratory Research (8703)  
401 M Street, SW  
Washington DC 20460

Applications sent via express mail should have the following telephone number listed on the express mail label: (202) 260-7445

## Special Instructions

The following special instructions apply to all applicants responding to this Request for Application:

- Applications must be unbound and clipped or stapled. The SF-424 must be the first page of the application. Budget information should immediately follow the SF-

424. All certification forms should be placed at the end of the application.

- Applicants must be identified by printing "OER-95" in block 10 of the SF-424. This will facilitate proper assignment and review of the application.
- A one-page abstract must be included with the application.
- The "project narrative" section of the application must not exceed 25, consecutively numbered, 8 1/2 x 11 inch pages of standard type (i.e., 12 point), including tables, graphs, and figures. For purposes of this limitation, the "project narrative" section of the application consists of the following six items:
  1. Description of Project
  2. Objectives
  3. Results or Benefits Expected
  4. Approach
  5. General Project Information
  6. Quality Assurance

Any attachments, appendices, and other references for the narrative section may be included but must remain within the 25-page limitation. Appendices will not be considered an integral part of the narrative.

Items not included under the 25-page limitation are the SF-424 and other forms, budgets, resumes, and the abstract. Resumes must not exceed two consecutively numbered pages for each investigator and should focus on education, positions held, and most recent or related publications.

Applications not meeting these requirements will be returned to the applicant without review.

## Quality Assurance

Data sets resulting from EPA-funded environmental research often are used directly by regulatory officials when establishing standards or when making other policy decisions. Explicit indicators of data quality are essential for determining whether a particular data set is appropriate for use in a specific context. To that end, EPA regulations require that grant-funded projects address quality assurance.

The application must include a quality assurance narrative statement, not to exceed two pages, which for each item listed below, either presents the required information or provides justification as to why the item does not apply to the proposed research.

- The intended use of the data and the associated acceptance criteria for data quality (i.e., precision, accuracy, representativeness, completeness, and comparability).
- Project requirements for precision, accuracy, representativeness, completeness, and comparability, and how these will be determined.

- Procedures for selection of samples or sampling sites, and collection or preparation of samples.
- Procedures for sample handling, identification, preservation, transportation, and storage.
- Description of measurement methods or test procedures, with a statement of performance characteristics if methods are nonstandard.
- Standard quality assurance/quality control procedures (e.g., American Society for Testing Materials, American Public Health Association) to be followed. Nonstandard procedures must be documented.
- Data reduction and reporting procedures, including description of statistical analyses to be used.
- availability and adequacy of facilities and equipment; and
- budget justification—justification for equipment will receive special attention.

A summary statement of the scientific review of the panel is provided to each applicant. 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.

## 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 immediately returned to the applicant without review.

## Funding Mechanism

The funding mechanism for all awards issued under this solicitation will consist of a grant agreement between EPA and the recipient.

In accordance with Public Law 95-224, a grant is used to accomplish a public purpose of support or stimulation authorized by federal statute rather than acquisition for the direct benefit of the Agency. In using a grant instrument rather than a cooperative agreement, EPA anticipates that there will be no substantial involvement during the course of the grant between the recipient and the Agency.

## Minority Institution Assistance

Pre-application assistance is available upon request for potential investigators representing institutions identified by the secretary, Department of Education, as Historically Black Colleges or Universities (HBCUs), Hispanic Association of Colleges and Universities (HACUs), or Native American or Tribal Colleges. For further information on minority assistance, contact Charles Mitchell by telephone at (202) 260-7448, by faxing a written request to (202) 260-0211, or by mailing it to the above-listed address for EPA's Office of Exploratory Research.

## Contacts

Additional general information on the grants program may be obtained by contacting

U.S. Environmental Protection Agency  
Office of Exploratory Research (8703)  
401 M Street, SW  
Washington DC 20460  
Phone: (202) 260-7474  
Fax: (202) 260-0211

Applicants with technical questions may contact the appropriate individual identified below.

## Guidelines and Limitations

All recipients are required to provide a minimum of 1% of the total project cost, which may not be taken from federal sources. Subcontracts for research to be conducted under the grant should not exceed 40% of the total direct cost of the grant for each year in which the subcontract is awarded.

## 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 eligible only under certain laws, and then under restrictive conditions, including the absence of any profit from the project. Federal agencies and federal employees are not eligible to participate in this program. Potential applicants who are uncertain of their eligibility should contact EPA's Grants Operations Branch at (202) 260-9266.

## Review and Selection

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

- quality of the research plan (including theoretical and/or experimental design, originality, and creativity);
- qualifications of the principal investigator and staff, including knowledge of relevant subject areas;
- potential contribution of the research to advancing scientific knowledge in the environmental area;

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## Contacts for Research Topics of Interest

### *Human Health Risk Assessment*

- Kevin Garrahan (202) 260-2588

### *Indoor Air Quality in Large Office Buildings*

- Ross V. Highsmith (919) 541-7828
- Kevin Y. Teichman (202) 260-7669

### *Air Pollutants (Particulates, Ozone, & Toxics)*

- Ila L. Cote (919) 541-3644 (particulates)
- James S. Vickery (919) 541-2184 (ozone)
- Larry T. Cupitt (919) 541-2454 (toxics)

### *Regional Hydrologic Vulnerability to Global Climate Change*

- Barbara M. Levinson (202) 260-5983
- Joel D. Scheraga (202) 260-4029