

US EPA ARCHIVE DOCUMENT



1998 TECHNOLOGY FOR A SUSTAINABLE ENVIRONMENT

EPA/NSF PARTNERSHIP FOR ENVIRONMENTAL RESEARCH

OPENING DATE: NOVEMBER 18, 1997

CLOSING DATE: FEBRUARY 17, 1998



Environmental Protection Agency



National Science Foundation

EPA / NSF PARTNERSHIP FOR ENVIRONMENTAL RESEARCH

Technology for a Sustainable Environment

Interagency Announcement of Opportunity

OPENING DATE: November 18, 1997

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1.0 INTRODUCTION

The National Science Foundation (NSF) and the Environmental Protection Agency (EPA) announce their intent to support a special awards competition in Fiscal Year (FY) 1998. This NSF-EPA competition has been developed based on a Memorandum of Understanding (MOU) signed on December 8, 1994. This MOU establishes a partnership between the two agencies emphasizing the support and merit review of fundamental, extramural environmental research. NSF and EPA's Office of Research and Development are continuing their cooperation in this extramural grants program in FY 1998. This is the fourth year of the joint special awards competition. Information on the FY 1995, 1996, and 1997 awards and the 1998 solicitation can be found on the Internet through: <http://www.nsf.gov> or <http://www.epa.gov/ncercqa>. There are four areas of interest in FY1998:

- A. Water and Watersheds
- B. Technology for a Sustainable Environment
- C. Decision-making and Valuation for Environmental Policy
- D. Environmental Statistics

This Announcement is directed only at research on Technology for a Sustainable Environment (TSE). The other three research areas are covered by other announcements. Awards made through this TSE competition are dependent upon responsiveness of the proposals to the announcement, the quality of the proposed research, and the availability of funds. Under this announcement, NSF and EPA anticipate awarding:

- Approximately \$4.5 million for Technology for a Sustainable Environment research, with a projected award range from \$50,000 to \$150,000 per award per year and an approximate duration of 2 to 3 years.

Proposals in response to this announcement must be received by February 17, 1998. It is anticipated that awards will be made by Fall 1998.

Further information, if needed, may be obtained from the NSF and EPA officials indicated below. E-mail inquiries are the preferred communication method.

GENERAL INFORMATION ON THE COMPETITION:

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2.0 TECHNOLOGY FOR A SUSTAINABLE ENVIRONMENT

2.1 Introduction

As a nation, we seek long-term economic growth that creates jobs while improving and sustaining the environment. It is increasingly clear that "end-of-pipe" pollution controls are not a sufficient means of reaching these goals.

A new generation of cleaner industrial manufacturing and processing technologies is needed that supports pollution prevention, efficient resource use, and industrial ecology. Such a strategy can help companies become more competitive by lowering resource and energy needs, reducing waste and emissions control costs, and fostering sustainable development.

This competition is designed to address pollution prevention processes, methodologies, and technology research. Research proposals are invited that advance the development and use of innovative technologies and approaches directed at avoiding or minimizing the generation of pollutants at the source. This competition is not intended to address issues related to waste monitoring, treatment, remediation, or containment other than those aspects that pertain to in-process recycling of waste. Research in the areas of remediation and treatment of hazardous materials, while very important, is supported by other program activities in both agencies.

NSF and EPA are providing funds for fundamental and applied research in the physical sciences and engineering that will lead to the discovery, development, and evaluation of advanced and novel environmentally benign methods for industrial processing and manufacturing. The competition addresses technological environmental issues of design, synthesis, processing, and the production and use of products in continuous and discrete manufacturing industries. Projects must employ fundamental new approaches, and address, or be relevant to, current national concerns for pollution prevention.

2.2 Description of Possible Research Projects

2.2.1 Chemistry for Pollution Prevention

The long-range goal of this program activity is to develop safer commercial substances and environmentally friendly chemical syntheses to reduce risks posed by existing practices. Pollution prevention has become the preferred strategy for reducing the risks posed by the design, manufacture, and use of commercial chemicals. Green chemistry, a fundamental approach to preventing pollution at the source, involves the design of chemicals and alternative chemical syntheses that do not utilize toxic feedstocks, reagents, or solvents or do not produce toxic by products or co-products.

Appropriate areas of investigation include: chemical synthesis and catalysis; analysis and detection; separation processes; and reaction mechanisms. Examples include:

- Development of innovative synthetic methods by means of catalysis and biocatalysis; photochemical,

electrochemical, or biomimetic synthesis; and use of starting materials which are innocuous or renewable.

- Development of alternative and creative reaction conditions, such as using solvents which have a reduced impact on health and the environment, or increasing reaction selectivity thus reducing wastes and emissions.
- Design or redesign of useful chemicals and materials such that they are less toxic to health and the environment or safer with regard to accident potential.

2.2.2 Engineering for Pollution Prevention

The focus of this program activity is to develop novel engineering approaches for preventing or reducing pollution from industrial manufacturing and processing activities, both for continuous and discrete processes. The scope includes: technology and equipment modifications, reformulation or redesign of products, substitution of alternative materials, and in-process changes. Although these methods are often thought of in relation to the chemical, biochemical, and materials process industries, they can be utilized in many other industries—such as semiconductor manufacturing systems. Potential areas of research include:

- **Biological Applications:** Development of innovative environmental technologies using bioengineering techniques such as metabolic engineering and bioprocessing to prevent pollution. Examples include research to convert waste biomass into useful products, genetic engineering to produce more specific biocatalysts, metabolic engineering and bioprocessing to increase energy efficiency, decrease use of hazardous reactants or byproducts, or develop more cost effective methods of producing environmentally benign products.
- **Fluid and Thermal Systems:** Improved manufacturing processes that employ novel thermal or fluid and/or multiphase/particulate systems resulting in significantly lower hazardous effluent production. Examples include: novel refrigeration cycles using safe and environmentally-benign working fluids to replace halogenated hydrocarbons hazardous to upper atmosphere ozone levels; improved automobile combustion process design for reduced pollutant production.
- **Interfacial Transport and Separations:** Materials substitutions and process alternatives which prevent or reduce environmental harm, such as change of raw material or the use of less hazardous solvents, organic coatings, and metal plating systems where the primary focus is on non-reactive diffusional and interfacial phenomena. Examples include: use of special surfac-

tant systems for surface cleaning and reactions; novel, cost-effective methods for the highly efficient in-process separation of useful materials from the components of the process waste stream, for example, field enhanced and hybrid separation processes; novel processes for molecularly controlled chemical and materials synthesis of thin films and membranes

- **Design, Manufacturing, and Industrial Innovations:** (a) New or improved manufacturing processes that reduce production of hazardous effluents at the source. Examples include: machining without the use of cutting fluids that currently require disposal after they are contaminated; eliminating toxic electroplating solutions by replacing them with ion or plasma-based dry plating techniques; new bulk materials and coatings with durability, long life, and other desirable engineering properties that can be manufactured with reduced environmental impact. (b) Optimization of existing discrete parts manufacturing operations to prevent, reduce, or eliminate waste. Concepts include: increased in-process or in-plant recycling and improved and intelligent process control and sensing capabilities; in-process techniques that minimize generation of pollutants in industrial waste incineration processes.
- **Chemical Processes and Reaction Engineering:** Improved reactor, catalyst, or chemical process design in order to increase product yield, improve selectivity, or reduce unwanted by-products. Approaches include novel reactors such as reactor-separator combinations that provide for product separation during the reaction, alternative energy sources for reaction initiation, and integrated chemical process design and operation, including control. Other approaches are: new multifunctional catalysts that reduce the number of process stages; novel heterogeneous catalysts that replace state-of-the-art homogeneous ones; new photo- or electro catalysts that operate at low temperatures with high selectivity; novel catalysts for currently uncatalyzed reactions; processes that use renewable resources in place of synthetic intermediates as feedstocks; novel processes for molecularly controlled materials synthesis and modification.

2.2.3 Measurement, Assessment, and Feedback Techniques for Pollution Prevention

This competition also encourages research in physical sciences and engineering that will lead to the development of novel measurement and assessment techniques for pollution prevention. Topics in this program activity include life cycle analysis, computational simulations, and process design algorithms for product life cycle analysis, as well as the development of appropriate measurement methods to

use as input for such analyses. The methods developed should provide the basis for scientifically sound and quantitative comparisons of the environmental impact of various technologies. The following examples provide some areas of investigation:

- Innovative, full scale, quantitative methodologies for conducting life cycle analysis which permit sound quantitative comparisons of impacts of different pollutants on different media.
- Streamlined, targeted life cycle analysis and environmental product design methodologies and systems that can provide scientifically sound comparisons with less comprehensive data inputs and computational analysis.
- Algorithms incorporating pollution prevention into process design, intelligent control, and simulation methodologies for process and manufacturing design.
- Process simulator modules for new technologies such as novel membrane processes.
- Molecular models that predict reaction selectivity in terms of a few fundamental properties of substances. Integration of those models into chemical reaction databases relevant to environmentally benign chemical processes.
- Improved and intelligent sensors and control algorithms for real time, in-process multivariate control of manufacturing equipment and systems to reduce waste material and hazardous emission.

2.3 Relation to Current and Past Agency Activities

The EPA/NSF Technology for a Sustainable Environment activity is an integral part of EPA's research program and supports the Green Chemistry, Common Sense Initiative, and other pollution prevention activities in the Agency. For NSF, this activity is an integral part of its Environmentally Benign Chemical Synthesis and Processing activity and its Environmentally Conscious Manufacturing program activity as described below.

2.3.1 Environmental Protection Agency

Green Chemistry Program: This program is directed at preventing pollution by promoting design of less toxic chemical substances and alternative chemical pathways that involve less toxic feedstocks, reagents, or solvents and generate fewer toxic products, by-products, or co-products. As part of this program, EPA has initiated the Green Chemistry Challenge to recognize and promote fundamental and innovative chemical methodologies that accomplish

pollution prevention through source reduction and that have a broad application in industry. Green chemistry encompasses all aspects and types of chemical processes - including synthesis, catalysis, analysis, monitoring, separations, and reaction conditions that reduce negative impacts on human health and the environment relative to the current state of the art. Through awards and grants programs, the Green Chemistry Challenge recognizes and promotes fundamental and innovative technologies that incorporate the principles of green chemistry into chemical design, manufacture, and use. The Green Chemistry Challenge Awards Program recognizes those in industry, academia, and government who have met the Green Chemistry objectives in an exemplary way, and the Green Chemistry Challenge Grants Program enhances support for cutting-edge research in this area.

Common Sense Initiative: EPA's Common Sense Initiative is directed toward finding better, cheaper, and faster ways of achieving environmental improvement through a stakeholder-based dialogue in six specific industrial sectors: metal finishing, printing, iron and steel, electronics, automobile assembly, and petroleum refining.

2.3.2 National Science Foundation

Environmentally Benign Chemical Synthesis and Processing (EBCS&P): This program, described in NSF 92-13, is aimed at preventing pollution by providing financial support for fundamental research in the identification of environmentally benign chemical and material synthesis and related manufacturing processes. For the NSF Engineering Directorate's Chemical and Transport Systems Division, the Technology for a Sustainable Environment activity subsumes the EBCS&P activity in Fiscal Year 1998. For the NSF Directorate of Mathematics and Physical Science's Division of Chemistry, research proposals are also accepted for EBCS&P activities for July 1, October 1, and January 1, target dates as part of its normal review process, as well as through this special NSF/EPA activity.

Environmentally Conscious Manufacturing (ECM): This competition addresses specific aspects of the Environmentally Conscious Manufacturing Initiative Announcement, NSF 95-91. Therefore in Fiscal Year 1998, the ECM activity is largely subsumed in this announcement. However, only those areas described in this solicitation will be considered; proposals in all other ECM topic areas may be submitted under the normal procedures for unsolicited NSF proposals (NSF 98-2) to the relevant divisions. Copies of NSF 95-91 announcement are available upon request (703-306-1330) and can also be obtained via the World Wide Web at <http://www.nsf.gov/cgi-bin/pubsys/browser/odbrowse.pl>

2.4 Additional Considerations

A clearer understanding of problems and more creative solutions often result from collaboration between academic and the industrial investigators who represent the eventual customers for the products of the research. Therefore, applicants are encouraged to seek meaningful project collaboration with industrial partners on fundamental research issues that link basic and applied aspects of pollution prevention. In some cases, state government agencies or professional organizations may be an appropriate substitute for an industrial partner. The NSF Grant Opportunities for Academic Liaison with Industry (GOALI) program announcement (NSF 97-116) outlines several mechanisms for these collaborations although others will also be considered.

Proposals may be submitted by individuals or small groups of investigators who are working on projects that will advance the concepts and technologies of pollution prevention.

Researchers from both academic and non-profit institutions may apply for support (see Section 3.0). Projects involving the training and education of junior scientists and engineers (such as graduate students) in academia through the research experience are very strongly encouraged.

In the present competition, reviewers will consider the potential impact of the research on pollution prevention, in addition to scientific criteria described by NSF's standard review criteria in *NSF Grant Proposal Guide* (NSF 98-2).

The total number of awards for this activity is dependent upon the technical merit of the proposals, their relation to the agencies' missions, and the financial support available to both agencies for this program. Projects selected for support may receive funds either individually from NSF or from EPA, or selected projects may be jointly supported by both agencies. This is at the option of the agencies, not the grantee.

3.0 ELIGIBILITY

Academic and not-for-profit institutions located in the U.S., and State or local governments are eligible. Profit-making firms and federal agencies are not eligible to apply to this program. However, personnel in profit-making firms may participate as non-funded co-investigators or through sub-contracts with the awardee institution.

Federal employees may cooperate or collaborate with eligible applicants within the limits imposed by applicable legislation and regulations. However, 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. Under exceptional circumstances the principal investigator's institution may 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, and unique analyses or instrumentation not available elsewhere. A written justification for such federal involvement must be included in the application, along with an assurance from the federal agency which commits it to supply the specified service. Federal employees may not receive salaries or in other ways augment their agency's appropriations through grants made by this program. Potential applicants who are uncertain of their eligibility should contact Dr. Robert E. Menzer (listed in Section 1.0).

EPA and NSF welcome applications on behalf of all qualified scientists, engineers, and other professionals and strongly encourage women, minorities, and persons with disabilities to compete fully in any of the programs described in this announcement.

In accordance with Federal statutes and regulations and EPA and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from the Environmental Protection Agency or the National Science Foundation.

4.0 INSTRUCTIONS FOR APPLICATION SUBMISSION

4.1 Sorting Codes

In order to facilitate proper assignment and review of applications, each applicant is asked to identify the topic area in which the application is to be considered. It is the responsibility of the applicant to correctly identify the proper sorting code. Failure to do so may result in an improper 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 and are shown below:

Chemistry for Pollution Prevention	98-NCERQA-H1
Engineering for Pollution Prevention:	
* Biological Applications	98-NCERQA-H2
* Fluid and Thermal Systems	98-NCERQA-H3
* Interfacial, Transport, Separations	98-NCERQA-H4
* Design, Manufacturing, and Industrial Innovations	98-NCERQA-H5
* Chemical Processes and Reaction Engineering	98-NCERQA-H6
Measurement, Assessment, and Feedback Techniques for Pollution Prevention	98-NCERQA-H7

The Sorting Code must be placed at the top of the abstract (as shown in the abstract format), on the title page (Standard Form 424), and must also be included in the address on the package that is sent to EPA (See Section 4.3).

4.2 The Application

The initial application is made through the submission of the application materials described below. It is important that the application contain all the information requested and be submitted in the formats described. If it is not, the application may be eliminated from review on administrative grounds. Once an applicant is chosen for award (i.e., after external peer review and internal programmatic review), additional documentation and forms will be requested by the Project Officer. 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 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:
- 1. Sorting Code:** Use the correct code that corresponds to the appropriate topic. (Be sure to substitute the appropriate code for the “XX” in 98-NCERQA-XX).
 - 2. Title:** Use the exact title as it appears in the rest of the application.
 - 3. Investigators:** List the names and affiliations of each investigator who will significantly contribute to the project. Start with the Principal Investigator.
 - 4. 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 they address the research needs identified in the solicitation, and (d) the **estimated improvement in risk assessment or risk management** that will result from successful completion of the work proposed.
 - 5. Supplemental Keywords:** A list of suggested keywords is provided for your use. Do not duplicate terms already used in the text of the abstract.

 **The abstract must not exceed one 8.5x11 inch page of single spaced standard 12 point type with 1 inch margins (see attached format).**

- 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, exclusive of the references cited and the results of prior Federal

support. The description must provide the following information:

1. Objectives: List objectives of the proposed research and/or the hypotheses being tested during the project. Include a statement on the context of the proposed research in relation to other environmental research in the particular area of work; this statement should also be synopsized in the objectives section of the abstract.

2. Approach: Outline the methods, approaches, and techniques that you intend to employ in meeting the objective stated above.

3. Expected Results or Benefits: Describe the results you expect to achieve during the project and the benefits of success as they relate to the topics in the announcement under which the proposal was submitted.

4. Results from Prior Federal Support: Provide information on the results of research conducted with prior or current Federal support. This must be limited to five pages but is in addition to the 15-page limit. This section should include information on any prior Federal awards closely related to the application (i.e., not limited to EPA or NSF awards).

5. 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.

6. Important Attachments: Appendices or other information may be included but must remain within the 15-page limit. References and Results of Prior Federal Support are in addition to the 15-page limit.

- E. Resumes:** The resumes of all principal investigators and important co-workers should be presented using NCERQA Form 5 (see attached). Each resume must not exceed two consecutively numbered (bottom center), 8.5x11 inch pages of single-spaced standard 12 point type with 1 inch margins.
- F. Current and Pending Support:** The applicant must identify any current and pending financial resources that are intended to support research. This should be done by Completing NSF Form 1239 (see attached) for each investigator and other senior personnel involved in the proposal. Failure to provide this information may delay consideration of your proposal. Updates of this information may be requested during the evaluation process.

G. Budget: A detailed, itemized budget for each year of the proposed project must be included. This budget must utilize the format shown in the attachment (do not try to squeeze your complete budget on the "form" shown as an example).

H. Budget Justification: This section should describe the basis for calculating the personnel, fringe benefits, travel, equipment, supplies, contractual support, construction, and other costs identified in the itemized budget. This should also include an explanation of how the indirect costs and charges 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, provide a statement on how quality 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.
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 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.

J. Postcard: The application must include a blank, self-addressed, stamped post card. This will be returned to the applicant to signify that the application has been received.

4.3 How to Apply

The original and fifteen (15) copies of the fully developed application and five (5) additional copies of the abstract (20 in all), must be received by NCERQA no later than 4:00 P.M. EST on the closing date, February 17, 1998.

The application and abstract must be prepared in accordance with these instructions. Informal, incomplete, or unsigned proposals will not be considered. Completed applications should be sent via regular mail to:

**Peer Review Division (8703R)
U.S. Environmental Protection Agency
Sorting Code: 98-NCERQA-XX**

(replace the "XX" with the appropriate code)
**401 M Street, SW
Washington DC 20460**

For express mail applications,
the following address must be used:

**Peer Review Division (8703R)
U. S. Environmental Protection Agency
Sorting Code: 98-NCERQA-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)

Proposals must be submitted to only one topic area, using a single sorting code. If you wish to submit more than one application to EPA or NSF, you must ensure that the research proposed is significantly different from the research in other proposals that have been submitted to this solicitation or from other grants you are currently receiving from any Federal government agency.

The sorting code must be identified in the address (as shown above). Please do not fail to substitute the appropriate code for the "XX" in 98 NCERQA-XX. Applications sent via express mail should have the following telephone number listed on the express mail label: (202) 564-6939.

4.4 Guidelines, Limitations, and Additional Requirements

Subcontracts for research to be conducted under the grant which exceed 40% of the total direct cost of the grant for each year in which the subcontract is awarded must be especially well justified.

Researchers may be invited to participate in an annual All-Investigators Meeting with EPA and NSF scientists and other grantees to report on research activities and to discuss areas of mutual interest. Travel funds should be budgeted to accommodate that eventuality.

The application must include a blank, self-addressed, stamped post card. This will be returned to the applicant to signify that the application has been received.

5.0 REVIEW AND SELECTION

5.1 Review Procedures

All grant applications are initially screened by EPA and NSF to determine their compliance with legal and administrative requirements. Acceptable applications are then reviewed by an appropriate technical peer review group. This review is designed to evaluate each proposal according to its technical merit. Each review group is composed primarily of non-EPA scientists, engineers, and/or social scientists who are experts in their respective disciplines. The reviewers use the following criteria to guide them in their reviews:

1. The originality and creativity of the proposed research, the potential contribution the proposed research could make to advance scientific knowledge in the environmental area, the appropriateness and adequacy of the research methods proposed, and the appropriateness and adequacy of the Quality Assurance Narrative Statement.

2. The qualifications of the principal investigator(s) and other staff, including knowledge of pertinent literature, experience, and publication records as well as the likelihood that the proposed research will be successfully completed.
3. The availability and/or adequacy of the facilities and equipment proposed for the project.
4. The responsiveness of the proposal to the research needs set forth in this solicitation.
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 input on the appropriateness and/or adequacy of the proposed budget and its implications on the potential success of the proposed research. Input on requested equipment is of particular interest.

Grants are selected on the basis of technical merit, relevancy to the research priorities outlined, program balance, and budget. In addition to the above criteria, other factors that will be taken into consideration by NSF in the evaluation and award process are described in section 6.3, paragraph 3.

Copies of the evaluations by the technical reviewers will be provided to each applicant. Funding decisions are the sole responsibility of EPA and NSF.

5.2 Proprietary Information

By submitting an application in response to this solicitation, the applicant grants EPA and NSF permission to share the application with technical reviewers both within and outside the Agencies. Applications containing proprietary or other types of confidential information will not be reviewed.

6.0 GRANT ADMINISTRATION

Upon conclusion of the review process, meritorious applications may be recommended for funding by either EPA and/or NSF, at the option of the agencies, not the applicant. Subsequent grant administration procedures will be in accordance with the individual policies of the awarding agency.

6.1 EPA Grant Administration

The funding mechanisms for all awards issued under this solicitation will consist of grant agreements between EPA and the recipient. In accordance with Public Law 95-

224, grants are 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 agreement, EPA anticipates that there will be no substantial involvement during the course of the grant between the recipient and the Agency.

EPA grants awarded as a result of this announcement will be administered in accordance with 40 CFR Part 30 and 40 or the most recent FDP terms and conditions, depending upon the grantee institution.

EPA provides awards for research in the sciences and engineering related to environmental protection. The awardee is solely responsible for the conduct of such activities and preparation of results for publication. EPA, therefore, does not assume responsibility for such findings or their interpretation.

6.2 NSF Grant Administration

NSF grants awarded as a result of this announcement will be administered in accordance with the terms and conditions of the most recent NSF GC-1, "Grant General Conditions," or the FDP-III, "Federal Demonstration Partnership General Terms and Conditions," depending on the grantee organization.

More comprehensive information on the administration of NSF grants is contained in the Grant Policy Manual (NSF 95-26, July 1995), for sale through the Superintendent of Documents, Government Printing Office (GPO), Washington, D.C. 20402. The telephone number at GPO is (202) 512-1800 for subscription information.

Organizations applying to NSF for the first time, or which have not received an NSF award within the preceding two years, should refer to the NSF Grant Policy Manual, Section 500, for instructions on specific information that may be requested by NSF. First time NSF awardees will be required to submit organizational, management, and financial information, including a certification of civil rights compliance, before a grant can be made. One copy of the Grant Policy Manual will be provided free of charge to new grantees.

Upon completion of an NSF project, a Final Project Report (NSF Form 98A) form will be sent to the grantee. Applicants should review this form prior to proposal submission so that appropriate tracking mechanisms are included in the proposal plan to ensure that complete information will be available at the conclusion of the project.

Activities described in this publication are in the following categories in the Catalog of Federal Domestic

Assistance (CFDA): 47.041 Engineering; 47.049 Mathematical and Physical Sciences.

6.3 NSF Applicant Information

The Foundation provides awards for research and education in the sciences and engineering. The awardee is wholly responsible for the conduct of such research and preparation of the results for publication. The Foundation, therefore, does not assume responsibility for the research findings or their interpretation.

The Foundation welcomes proposals from all qualified scientists and engineers and strongly encourages women, minorities, and persons with disabilities to compete fully in any of the research and education related programs described here. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subject to discrimination under any program or activity receiving financial assistance from the National Science Foundation.

NSF will consider in the evaluation and award process the broader impacts of the proposed research activity, in addition to addressing the criteria stated in the section 5.1. Questions to be considered are: How well does the activity advance discovery and understanding while promoting teaching, training, and learning? How well does the proposed activity broaden the participation of underrepresented groups (e.g., gender, ethnicity, geographic, etc.)? To what extent will it enhance the infrastructure for research and education, such as facilities, instrumentation, networks and partnerships? Will the results be disseminated broadly to enhance scientific and technological understanding? What may be the benefits of the proposed activity to society?

Facilitation Awards for Scientists and Engineers with Disabilities (FASSED) provide funding for special assistance or equipment to enable persons with disabilities (investigators and other staff, including student research assistants) to work on NSF projects. See the program announcement or contact the program coordinator at (703) 306-1636.

Privacy Act. The information requested on proposal forms is solicited under the authority of the National Science Foundation Act of 1950, as amended. It will be used in connection with the selection of qualified proposals and may be disclosed to qualified reviewers and staff assistants as part of the review process; to applicant institutions/grantees; to provide or obtain data regarding the application review process, award decisions, or the administration of awards; to government contractors, experts, volunteers, and researchers as necessary to complete

assigned work; and to other government agencies in order to coordinate programs. See Systems of Records, NSF 50, Principal Investigators/Proposal File and Associated Records, and NSF-51, 60 Federal Register 4449 (January 23, 1995), Reviewer/Proposal File and Associated Records, 59 Federal Register 8031 (February 17, 1994).

Public Burden. Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of your receiving an award.

The public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Gail A. McHenry, Reports Clearance Officer, Information Dissemination Branch, National Science Foundation, 4201 Wilson Boulevard, Suite 245, Arlington, VA 22230.

The National Science Foundation has TDD (Telephonic Device for the Deaf) capability, which enables individuals with hearing impairment to communicate with the Foundation about NSF programs, employment, or general information. To access NSF TDD, dial (703) 306-0090; for FIRS, 1-800-877-8339.

APPLICATION FOR FEDERAL ASSISTANCE

1. TYPE OF SUBMISSION Application ☐ Construction ☐ Non-Construction		Preapplication ☐ Construction ☐ Non-Construction		2. DATE SUBMITTED	Applicant Identifier
3. DATE RECEIVED BY STATE		State Applicant Identifier			
4. DATE RECEIVED BY FEDERAL AGENCY		Federal Identifier			
5. APPLICANT INFORMATION IS THIS PROPOSAL BEING SUBMITTED TO ANOTHER FEDERAL AGENCY? ☐ YES ☐ NO IF YES, LIST ACRONYM(S)					
Legal Name:			Organizational Unit:		
Address (give city, county, state, and zip code):			Name and telephone and E-mail number of the person to be contacted on matters involving this application (give area code) PI: ADMIN. CONTACT:		
6. EMPLOYER IDENTIFICATION NUMBER (EIN): -			7. TYPE OF APPLICANT: (enter appropriate letter in box) ☐ A. State B. County C. Municipal D. Township E. Interstate F. Intermunicipal G. Special District H. Independent School Dist. I. State Controlled Institution of Higher Learning J. Private University K. Indian Tribe L. Individual M. Profit Organization N. Other (Specify) _____		
8. TYPE OF APPLICATION: ☐ New ☐ Continuation ☐ Revision If Revision, enter appropriate letter(s) in box(es): ☐ ☐ A. Increase Award B. Decrease Award C. Increase Duration D. Decrease Duration Other (specify): _____			9. NAME OF FEDERAL AGENCY: U.S. Environmental Protection Agency - ORD - NCERQA		
10. CATALOG OF FEDERAL DOMESTIC ASSISTANCE NUMBER: 6 6 . 5 0 0 TITLE: 98-NCERQA - _ _ _			11. DESCRIPTIVE TITLE OF APPLICANT'S PROJECT:		
12. AREAS AFFECTED BY PROJECT (cities, counties, states, etc.):					
13. PROPOSED PROJECT:		14. CONGRESSIONAL DISTRICTS OF:			
Start Date	Ending Date	a. Applicant		b. Project	
15. ESTIMATED TOTAL PROJECT FUNDING:		16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?			
a. Federal	\$.00	a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW ON: DATE _____			
b. Applicant	\$.00	b. NO. ☐ PROGRAM IS NOT COVERED BY E.O. 12372			
c. State	\$.00	☐ OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW			
d. Local	\$.00				
e. Other	\$.00				
f. Program Income	\$.00	17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?			
g. TOTAL	\$.00	☐ Yes If "Yes," attach an explanation. ☐ No			
18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT. THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE APPLICANT WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.					
a. Typed Name of Authorized Representative			b. Title		c. Telephone number
d. Signature of Authorized Representative					e. Date Signed

INSTRUCTIONS FOR THE SF 424

This is a standard form used by applicants as a required facesheet for preapplications and applications submitted for Federal Assistance. It will be used by Federal agencies to obtain applicant certification that States which have established a review and comment procedure in response to Executive Order 12372 and have selected the program to be included in their process, have been given an opportunity to review the applicant's submission.

- | Item: | Entry: | Item: | Entry: |
|-------|--|-------|---|
| 1. | Self-explanatory. | 12. | List only the largest political entities affected (e.g., State, counties, cities.) |
| 2. | Date application submitted to Federal agency (or State, if applicable) & applicant's control number (if applicable). | 13. | Self-explanatory. |
| 3. | State use only (if applicable). | 14. | List the applicant's Congressional Districts and any District(s) affected by the program or project. |
| 4. | If this application is to continue or revise an existing award, enter present Federal identifier number. If for a new project, leave blank. | 15. | Amount requested or to be contributed during the first funding/budget period by each contributor. Value of in-kind contributions should be included on appropriate lines as applicable. If the action will result in a dollar change to an existing award, include <u>only</u> the amount of the change. For decreases, enclose the amounts in parentheses. If both basic and supplemental amounts are included, show breakdown on an attached sheet. For multiple program funding, use totals and show breakdown using same categories as item 15. |
| 5. | Legal name of applicant, name of primary organizational unit which will undertake the assistance activity, complete address of the applicant, and name and telephone number of the person to contact on matters related to this application. | 16. | Applicants should contact the State Single Point of Contact (SPOC) for Federal Executive Order 12372 to determine whether the application is subject to the State intergovernmental review process. |
| 6. | Enter Employer Identification Number (EIN) as assigned by the Internal Revenue Service. | 17. | This question applies to the applicant organization, not the person who signs as the authorized representative. Categories of debt include delinquent audit allowances, loans and taxes. |
| 7. | Enter the appropriate letter in the space provided. | 18. | To be signed by the authorized representative of the applicant. A copy of the governing body's authorization for you to sign this application as official representative must be on file in the applicant's office. (Certain Federal agencies may require that this authorization be submitted as part of the application.) |
| 8. | Check appropriate box and enter appropriate letter(s) in the space(s) provided:

— "New" means a new assistance award.

— "Continuation" means an extension for an additional funding/budget period for a project with a projected completion date.

— "Revision" means any change in the Federal Government's financial obligation or contingent liability from an existing obligation. | | |
| 9. | Name of Federal agency from which assistance is being requested with this application. | | |
| 10. | Use the Catalog of Federal Domestic Assistance number and title of the program under which assistance is required. | | |
| 11. | Enter a brief descriptive title of the project. If more than one program is involved, you should append an explanation on a separate sheet. If appropriate (e.g., construction or real property projects), attach a map showing project location. For preapplications, use a separate sheet to provide a summary description of this project. | | |

KEY CONTACTS FORM

- **Authorized Representative:** *Original awards and amendments will be sent to this individual for review and acceptance, unless otherwise indicated.*

Name: _____
Title: _____
Complete Address: _____

Phone Number: _____

- **Payee:** *Individual authorized to accept payments.*

Name: _____
Title: _____
Complete Address: _____

Phone Number: _____

- **Administrative Contact:** *Individual from Sponsored Programs Office to contact concerning administrative matters (i.e., indirect cost rate computation, rebudgeting requests etc.)*

Name: _____
Title: _____
Complete Address: _____

Phone Number: _____
FAX Number: _____
E-Mail Number: _____

- **Principal Investigator:** *Individual responsible for the technical completion of the proposed work.*

Name: _____
Title: _____
Complete Address: _____

Phone Number: _____
FAX Number: _____
E-Mail Number: _____

EPA STAR Grant Abstract (*Example Format*)

Sorting Code: 98-NCERQA-XX (use the correct code that corresponds to the appropriate RFA topic)

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

Investigators: List the names and affiliations of each investigator who will significantly contribute to the project. Start with the Principal Investigator.

Institution: Name of university or other applicant.

Project Period: October 1, 1998--September 30, 2000, for example.

Research Category: Enter your research topic name.

Project Summary:

Objectives/Hypothesis: include a short statement on the context of the proposed research in relation to other environmental research in the particular area of work

Approach: outline the methods, approaches, and techniques you intend to employ in meeting the objectives

Expected Results:

including a brief description of the

Improvements in Risk Assessment or Risk Management

that will be realized if the expected results are achieved

Supplemental Keywords: see attached suggestions. Do not duplicate terms used in the text of the abstract.

SUGGESTED KEYWORDS

Media: (media, air, ambient air, atmosphere, ozone, water, drinking water, watersheds, groundwater, land, soil, sediments, acid deposition, global climate, indoor air, mobile sources, CASTNET, stratospheric ozone, tropospheric, marine, estuary, precipitation, leachate, adsorption, absorption, chemical transport)

Risk Assessment: (exposure, risk, risk assessment, effects, health effects, ecological effects, human health, bioavailability, metabolism, vulnerability, sensitive populations, dose-response, carcinogen, teratogen, mutagen, animal, mammalian, organism, cellular, population, enzymes, infants, children, elderly, stressor, age, race, diet, metabolism, genetic pre-disposition, genetic polymorphisms, sex, ethnic groups, susceptibility, cumulative effects)

Chemicals, toxics, toxic substances: (chemicals, toxics, particulates, ODS, VOC, CFC, PAH, PNA, PCB, dioxin, metals, heavy metals, solvents, oxidants, nitrogen oxides, sulfates, organics, DNAPL, NAPL, pathogens, viruses, bacteria, acid rain, effluent, discharge, dissolved solids, intermediates)

Ecosystem Protection: (ecosystem, indicators, restoration, regionalization, scaling, terrestrial, aquatic, habitat, integrated assessment)

Risk Management: pollution prevention (green chemistry, life-cycle analysis, alternatives, sustainable development, clean technologies, innovative technology, renewable, waste reduction, waste minimization, environmentally conscious manufacturing); treatment (remediation, bioremediation, cleanup, incineration, disinfection, oxidation, restoration)

Public Policy: (public policy, decision making, community-based, cost-benefit, conjoint analysis, observation, non-market valuation, contingent valuation, survey, psychological, preferences, public good, Bayesian, socio-economic, willingness-to-pay, compensation, conservation, environmental assets, sociological)

Scientific Disciplines: (environmental chemistry, marine science, biology, physics, engineering, social science, ecology, hydrology, geology, histology, epidemiology, genetics, pathology, mathematics, limnology, entomology, zoology)

Methods/Techniques: (EMAP, modeling, monitoring, analytical, surveys, measurement methods, general circulation models, climate models, satellite, landsat, remote sensing)

Geographic Areas: (Northeast, central, Northwest, Chesapeake Bay, Great Lakes, Midwest, Mid-Atlantic, states: {use both full name and two letter abbreviation}, EPA Regions 1 through 10)

Sectors: (agriculture, business, transportation, industry {petroleum, electronics, printing, etc}:{identify 4 digit SIC codes}, service industry, food processing, etc)

BIOGRAPHICAL SKETCH

Provide the following information for the senior personnel on the project. Begin with the Principal Investigator/Project Director (PI/PD).

DO NOT EXCEED 2 PAGES PER PERSON

- A. Vitae, listing professional and academic essentials and mailing address.
- B. List up to 5 publications most closely related to the proposed project and up to 5 other significant publications, including those accepted for publication. Patents, copyrights or software systems developed may be substituted for publications. Do not include additional lists of publications, invited lectures, etc. Only the list of up to 10 will be used in merit review.
- C. A list of persons (including their organizational affiliations) who have collaborated on a project or a book, article, report or paper within the last 48 months, including collaborators on this proposal. If there are no other collaborators, this should be indicated.
- D. A list of the names of persons (including their organizational affiliations) over the past five years, with whom this individual has had an association as thesis advisor and postdoctoral scholar sponsor. Also include a summary of the total number of graduate students advised and postdoctoral scholars sponsored.
- E. The names and institutions of this individual's own graduate and postgraduate advisors.

The information in C, D, and E is used to help identify potential conflicts or bias in the selection of reviewers.

US EPA ARCHIVE DOCUMENT

The following information should be provided for each investigator and other senior personnel. Failure to provide this information may delay consideration of this proposal.	
Investigator:	Other agencies (including NSF) to which this proposal has been/will be submitted.

Other agencies (including NSF) to which this proposal has been/will be submitted.

Sumr:

USE ADDITIONAL SHEETS AS NECESSARY

Itemized Budget for EPA STAR Grant Applications (*Example Format*)

CATEGORIES	YEAR ONE	YEAR TWO	YEAR THREE	TOTAL PROJECT
a. Personnel Principal Investigator Co-PI Research Scientists Postdoctoral Scientists Other Personnel				
TOTAL PERSONNEL COSTS				
b. Fringe Benefits _____ % of _____				
c. Travel Trip 1 Trip 1 Trip 1 ...etc.				
TOTAL TRAVEL COSTS				
d. Equipment Item 1 Item 2 Item 3 ...etc.				
TOTAL EQUIPMENT COSTS				
e. Supplies Item 1 Item 2 Item 3 ...etc.				
TOTAL SUPPLY COSTS				
f. Contracts 1 2 3 ...etc.				
TOTAL CONTRACTUAL COSTS				
g. Other Item 1 Item 2 Item 3 ...etc.				
TOTAL OTHER COSTS				
h. TOTAL DIRECT COSTS (sum of a-g)				
i. Indirect Costs/Charges _____ % of _____ (base)				
j. TOTAL PROJECT COSTS (sum of h & i)				
k. TOTAL REQUESTED FROM EPA				