

# Basic Research to Enable Agricultural Development (BREAD)

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## PROGRAM SOLICITATION NSF 09-566

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National Science Foundation  
Directorate for Biological Sciences

**Letter of Intent Due Date(s) (required)** (due by 5 p.m. proposer's local time):

August 05, 2009

**Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

September 09, 2009

### IMPORTANT INFORMATION AND REVISION NOTES

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This is a new component of the Plant Genome Research Program (PGRP).

Please be advised that the *NSF Proposal & Award Policies & Procedures Guide* (PAPPG) includes revised guidelines to implement the mentoring provisions of the America COMPETES Act (ACA) (Pub. L. No. 110-69, Aug. 9, 2007.) As specified in the ACA, each proposal that requests funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals. Proposals that do not comply with this requirement will be returned without review (see the PAPP Guide Part I: *Grant Proposal Guide* Chapter II for further information about the implementation of this new requirement).

### SUMMARY OF PROGRAM REQUIREMENTS

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#### General Information

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**Program Title:**

Basic Research to Enable Agricultural Development (BREAD)  
A program jointly supported by NSF and the Bill & Melinda Gates Foundation (BMGF)

**Synopsis of Program:**

The National Science Foundation (NSF) and the Bill & Melinda Gates Foundation (BMGF) are partnering to support a new research program to be administered by NSF. The objective of the BREAD Program is to support innovative scientific research designed to address key constraints to smallholder agriculture in the developing world. A significant distinction between BREAD and other NSF programs is that proposals to BREAD must make a clear and well-defined connection between the outcomes of the proposed research and its direct relevance and potential application to agriculture in the developing world. The BREAD Program will take the activities of the PGRP to the next level by supporting a broader range of scientific research and by enabling funding to be allocated to international collaborators through subawards.

The Program's focus is on novel, transformative research at the proof-of-concept stage rather than its application or development. Especially encouraged are original proposals that address major constraints to the productivity of crops important to smallholder farmers, or on the development of novel and efficient production practices. Although the Program places an initial emphasis on crop improvement, it will also consider innovative research proposals from scientists in all fields of research and engineering as long as the proposed research is consistent with the Program objectives. Proposals are also expected to address project outcomes in the context of broader societal impacts, and as appropriate to the research proposed, engage international partners in scientific collaborations.

**Cognizant Program Officer(s):**

- Diane Jofuku Okamura, 690N, telephone: (703) 292-4400, email: [BREAD-WG@nsf.gov](mailto:BREAD-WG@nsf.gov)

**Applicable Catalog of Federal Domestic Assistance (CFDA) Number(s):**

- 47.074 --- Biological Sciences

## Award Information

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**Anticipated Type of Award:** Continuing Grant

**Estimated Number of Awards:** 10 to 20

**Anticipated Funding Amount:** \$6,000,000 Up to \$6 million is anticipated to be available for first-year funding of this program in FY 2010, subject to availability of funds.

## Eligibility Information

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### Organization Limit:

Proposals may only be submitted by the following:

- Universities and colleges [universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.]; US non-profit research organizations, including museums, research laboratories, professional societies; or similar organizations in the US that are directly associated with educational or research activities; or consortia led by the eligible organizations listed here.

A proposal from a consortium of organizations must be submitted as a single proposal with one US organization serving as the lead and all other organizations as subawardees. ***Separately submitted collaborative proposals will not be accepted and will be returned without review.***

Subawards may be made to US or non-US academic institutions, research organizations, research laboratories, professional societies and similar organizations that are directly associated with educational or research activities.

### PI Limit:

The PI must hold a position at an eligible US institution (as defined above).

### Limit on Number of Proposals per Organization:

None Specified

### Limit on Number of Proposals per PI: 1

An investigator may serve as PI or Co-PI on only **one** proposal submitted in response to this solicitation.

## Proposal Preparation and Submission Instructions

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### A. Proposal Preparation Instructions

- **Letters of Intent:** Submission of Letters of Intent is required. Please see the full text of this solicitation for further information.
- **Preliminary Proposal Submission:** Not Applicable
- **Full Proposal Preparation Instructions:** This solicitation contains information that deviates from the standard NSF Proposal and Award Policies and Procedures Guide, Part I: Grant Proposal Guide (GPG) proposal preparation guidelines. Please see the full text of this solicitation for further information.

### B. Budgetary Information

- **Cost Sharing Requirements:** Cost Sharing is not required under this solicitation.
- **Indirect Cost (F&A) Limitations:** Indirect cost limitations apply to non-US subaward institutions. Please see the full text of this solicitation for further information.
- **Other Budgetary Limitations:** Other budgetary limitations apply. Please see the full text of this solicitation for further information.

### C. Due Dates

- **Letter of Intent Due Date(s) (required)** (due by 5 p.m. proposer's local time):  
August 05, 2009
- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):  
September 09, 2009

## Proposal Review Information Criteria

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**Merit Review Criteria:** National Science Board approved criteria. Additional merit review considerations apply. Please see the full text of this solicitation for further information.

## Award Administration Information

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**Award Conditions:** Standard NSF award conditions apply.

**Reporting Requirements:** Additional reporting requirements apply. Please see the full text of this solicitation for further information.

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## I. INTRODUCTION

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Agriculture is benefiting from advances in genomics made over the past decade and the outcomes of this research have allowed academic and industrial researchers to expand the breeders' toolkit, for example, to exploit the diversity of agronomically useful traits in wild and domesticated crop plants and to accelerate the development of new plant varieties through marker-assisted breeding. While support is available to promote the downstream applications derived from advances in science and technology to address constraints to developing country agriculture, there have been fewer funding opportunities to support development of cutting-edge and creative new approaches.

Clearly, new collaborations among a broad range of scientists and engineers are needed that lead to a different way of thinking about the major problems facing developing country agriculture. The NSF and the BMGF are partnering to offer a new research program to foster these collaborations and the transformative research that will emerge. The goal of the new BREAD Program is to build on the accomplishments of the National Plant Genome Initiative (NPGI), extending the opportunities to include international partners in efforts to generate innovative, science-based solutions to problems of smallholder agriculture in developing countries. Through these new partnerships and projects, it is anticipated that the Program will change the research culture to one that is more broadly inclusive of these needs.

The BREAD Program is a component of the Plant Genome Research Program (PGRP) that began in Fiscal Year 1998 as part of the NPGI. A new five-year plan for the NPGI was released in January 2009 (<http://www.ostp.gov/galleries/NSTC/NPGI%20Five-Year%20Plan%202009-2013.pdf>). The overall goals of the NPGI are to support basic research in plant genomics and to accelerate the acquisition and utilization of new knowledge and innovative approaches to elucidating fundamental biological processes in plants. The focus of the NPGI is on plants of agricultural importance and plant processes of potential agronomic value.

Since 2004, the PGRP has offered the Developing Country Collaborations in Plant Genome Research (DCC-PGR) funding opportunity ([http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=12789&org=BJO](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12789&org=BJO)) to support research collaborations between US scientists and scientists from developing countries as part of ongoing or new PGRP awards. The intent of the DCC-PGR program is to support collaborative research linking US researchers with partners from developing countries to solve problems of mutual interest in agriculture, energy and the environment, while placing US and international researchers at the center of a global network of scientific excellence.

The BREAD Program represents a new opportunity within the PGRP that allows for a broader engagement of researchers across disciplines and across international boundaries to form a new community of scientists who may not have worked together before. However, you do not have to have been part of a PGRP or DCC-PGR project to participate in BREAD.

## II. PROGRAM DESCRIPTION

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The advances made over the past decade of the Plant Genome Research Program (PGRP) have led to the development of resources with potential benefit far beyond US agriculture. Indeed, the Dear Colleague Letter for Developing Country Collaborations in Plant Genome Research ( NSF 04-563 : [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=12789&org=BIO](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12789&org=BIO) ) encourages proposers to consider inclusion of collaborative activities focused on research problems of importance to developing countries, including scientist-to-scientist interactions with the potential to lead to long-term partnerships among participating laboratories. Supported activities have included joint research projects and reciprocal exchange visits of up to one year in length. PGRP funding is provided to US institutions only.

The new BREAD Program will take the activities of the PGRP and DCC-PGR to the next level by supporting a broader range of scientific research and by enabling funding to be provided to eligible, US or non-US institutions through subawards. A major distinction between the BREAD Program and other programs at NSF is that proposals to the BREAD Program must make a clear and well-defined connection between the outcomes of the proposed research and its direct relevance and potential application to smallholder farming in the developing world. The Program focus is on novel, transformative research at the proof-of-concept stage rather than application or redevelopment of existing research outcomes. The Program is also receptive to high risk projects provided that they employ sound scientific principles and offer a high return if successful. High risk projects that do not provide a sound scientific basis for the proposed approach will be less competitive than projects that do provide this justification.

Proposals to the BREAD Program should employ state-of-the-art scientific approaches that address key constraints to agriculture as practiced by smallholder farmers in the developing world. For the purposes of this program, developing world countries are those defined by the World Bank as low- and middle-income economies (see World Bank Country Classification page, <http://www.worldbank.org/data/countryclass/classgroups.htm>). While projects may target constraints in specific regions of the developing world, those with the potential to impact broadly large areas and/or numbers of farmers would receive the highest priority for funding. However, the Program is not intended to target any specific country or region preferentially, and institutions eligible for sub-awards may exist in any country of the world, excluding those that are currently embargoed by the US government.

Successful applications will be ones that generate new knowledge and/or test new hypotheses to enable discoveries that can be moved rapidly to the field where needed and translated into future agricultural advances in developing countries. If proposals include one or more international developed or developing country partners, their specific role(s) and contributions to the project should be justified. While inclusion of a developing world partner is not a strict requirement, it is strongly encouraged.

Proposed projects may include a broad range of activities, from basic research to technology development and while genomics approaches can be involved, they are not required. However, proposals that are of a purely applied nature and focus on delivery of current technologies are beyond the scope of the BREAD Program.

Especially encouraged are original proposals that address key constraints to the productivity of crops important to smallholder farmers, or impact development of novel and efficient production practices. Although the major focus of the BREAD Program will be on approaches and technologies most relevant for smallholder agriculture in the developing world, it is recognized that some projects may be relevant to all crops (e.g., novel approaches to enhancing yield or tolerance to plant stresses such as drought or salinity), and so the program would also consider proposals for such projects. Recognizing that innovative ideas relevant to agriculture may come from many scientific disciplines, the Program will also consider innovative research proposals from scientists in all fields of science and engineering (excluding economics or the social sciences) as long as the proposed research is consistent with the BREAD Program objectives. However, proposals of any kind that focus on development of existing tools or resources or that would result in only small advances are outside the scope of this program.

Interdisciplinary proposals are encouraged, especially those that bring together researchers from disciplines that would not normally work together to focus on novel questions or challenges. Proposers are encouraged to consider carefully the roles of each co-PI or collaborator to ensure that each brings a unique, appropriate and necessary expertise to the project.

Simultaneous submission of proposals to this program and another source of funding is permissible with prior written approval of the funding agencies involved. A proposal from the submitter that is a duplicate of, or substantially similar to, a proposal already under consideration by NSF will be returned without review.

The BREAD Program should NOT be viewed as a mechanism to support the type of fundamental research that is or has already been supported through other programs at NSF or other similar agencies. Proposers are strongly encouraged to review carefully additional information provided on the Program web site ([http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=503403](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503403)) and to contact the Program Director for further guidance.

Examples of eligible research areas would include, but are by no means limited to, the following:

- Basic research that seek to exploit new discoveries in the plant sciences to develop novel ways to enhance the yield or the nutritional content of crops important to small-scale farmers.
- New strategies for creating resistance to major diseases and pests that affect plants, animals or insects of agricultural importance, and that have major impact in broad regions of the developing world.
- Novel approaches to basic research on the enhancement of water-, nitrogen- or phosphate-use efficiency in crops or to gain a better understanding and control of agronomically important processes such as tolerance to drought and salinity.
- Novel approaches to using the genetic diversity of plants, microbes, or animals to enhance the ability of small-scale farmers to adapt to emerging threats of global climate change, emerging diseases, and the rising costs of energy.
- Development of new products or novel ways to enhance the ability of plant and animal products to delay ripening and/or withstand storage under less-than-ideal conditions prevalent in many parts of the developing world.
- Application of new advances in fields such as nanotechnology to the development of novel and more efficient ways to deliver fertilizers and thus address poor soil fertility without negatively affecting the environment.
- Creation of novel low-cost, high-throughput tools for use in breeding or disease diagnostics, especially suited to developing world agriculture.
- Basic research towards the development of new technologies or devices for local or remote monitoring of crops.
- Basic research aimed at development of low-cost, efficient devices for energy production and storage appropriate to small-scale agriculture in remote settings.

### Additional considerations:

*International Collaboration:* International collaborative plant genome research is actively pursued all over the world. International research collaboration is strongly encouraged in the BREAD Program, particularly with investigators from developing countries, and especially where there is a common research focus or system. **However, the PI must hold an appointment at an eligible US institution. Proposals will not be accepted from a non-US institution serving as the lead institution. Subawardee(s) may be eligible US or non-US institutions.** Subaward activities should be clearly connected to the overall goals of the proposed research and the human and institutional capacities available for the project described for each institution. **Before proposal submission, all proposed US or non-US subawardee institutions must be registered with Central Contractor Registration**

(<http://www.ccr.gov>). This registration takes approximately 2-3 weeks, and there are no financial requirements for registration.

*Industrial Collaboration:* Private industry has already made a significant investment in plant genomic research. Innovative collaborations with industry are encouraged when they advance the goals of the program. Participation of a company as a provider of a service should be managed according to the submitting institution's procurement policy. When private industry is involved, the proposer is responsible for ensuring that any intellectual property issues are handled according to the program policy (see section A-1 under Special Information and Supplementary Documentation below).

*Integration of Research and Education and Broadening Participation:* Proposers are encouraged to take advantage of opportunities to train young scientists in the course of proposed projects and to promote increased participation by members of under-represented groups. Innovative approaches to training are encouraged where they fit with the goals of the proposal and may include training of young scientists in research programs of institutions in the developing world that are building programs that aim to apply the advanced sciences to agriculture. However, proposals focused primarily on supporting existing or new training programs are not eligible and may be returned without review. A mentoring plan must be included for all supported postdoctoral researchers and students as specified under Special Information and Supplementary Documentation sections A-5 and A-6 below.

*Data sharing:* Proposals that would generate large amounts of data or new software and the like should present a plan for how these resources will be made widely available and accessible, notably to developing countries. Where appropriate, project outcomes are expected to meet current community standards for genomic data and be deposited into existing long-lived community databases. For more details, see section A-1 under Special Information and Supplementary Documentation below.

*Societal Impacts:* The societal benefits and potential long-term impacts on developing country agriculture of the proposed research should be integrated into the Project Description.

### III. AWARD INFORMATION

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Most projects are anticipated to be supported for 3 years, with funding for each succeeding year dependent upon meeting annual financial and technical reporting requirements. Awards may range in size from \$150,000 per year to a total of \$600,000 per year for projects involving no more than 3 subawardee institutions. Proposers of projects with budgets outside these general guidelines should consult with the Program Director prior to proposal submission.

### IV. ELIGIBILITY INFORMATION

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#### Organization Limit:

Proposals may only be submitted by the following:

- Universities and colleges [universities and two- and four-year colleges (including community colleges) accredited in, and having a campus located in the US, acting on behalf of their faculty members. Such organizations also are referred to as academic institutions.]; US non-profit research organizations, including museums, research laboratories, professional societies; or similar organizations in the US that are directly associated with educational or research activities; or consortia led by the eligible organizations listed here.

A proposal from a consortium of organizations must be submitted as a single proposal with one US organization serving as the lead and all other organizations as subawardees. ***Separately submitted collaborative proposals will not be accepted and will be returned without review.***

Subawards may be made to US or non-US academic institutions, research organizations, research laboratories, professional societies and similar organizations that are directly associated with educational or research activities.

#### PI Limit:

The PI must hold a position at an eligible US institution (as defined above).

#### Limit on Number of Proposals per Organization:

None Specified

#### Limit on Number of Proposals per PI: 1

An investigator may serve as PI or Co-PI on only **one** proposal submitted in response to this solicitation.

#### Additional Eligibility Info:

None.

### V. PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

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#### A. Proposal Preparation Instructions

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**Letters of Intent (required):**

Letters of Intent are required but non-binding. The Letters of Intent will be used to guide the Program in identification of reviewers and panelists appropriate for the anticipated scope and number of proposals. However, feedback will not be provided to the submitters. One letter may be submitted per PI.

Letters of Intent should contain the following materials only:

1. Name and institution of the PI, as well as the names, institutions, and locations of anticipated co-PIs and collaborators.
2. Title of the proposal
3. Summary of the proposed work in 2500 characters or less

**Letter of Intent Preparation Instructions:**

When submitting a Letter of Intent through FastLane in response to this Program Solicitation please note the conditions outlined below:

- Sponsored Projects Office (SPO) Submission is not required when submitting Letters of Intent
- Project Personnel (including institutions and countries) is required when submitting Letters of Intent
- Submission of multiple Letters of Intent is not allowed

**Full Proposal Instructions:** Proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the guidelines specified in the NSF Grant Proposal Guide (GPG). The complete text of the GPG is available electronically on the NSF website at: [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=gpg](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=gpg). Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-PUBS (7827) or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov).

**Special Instructions for BREAD Proposal Preparation:** Unless indicated below, proposers should follow the guidelines for Full Proposals as outlined in the NSF Grant Proposal Guide.

**Proposal Cover Sheet:** In the NSF FastLane system, follow the instructions on proposal preparation. When completing the cover sheet, please consider the following. The Project title must start with "BREAD:...." Click on the "GO" button at "Program Announcement/Solicitation/Program Description No." Highlight BREAD Program and click on the "SELECT" button. Your proposal will automatically be assigned to BIO—BREAD Program. Be sure to complete the remainder of the cover sheet information.

**Project Summary (maximum 1 page):** The project summary should consist of three separate parts in the following order:

1. A list of US and non-US senior personnel (PI, Co-PIs, key collaborators) along with their home institutions;
2. A summary of the scientific objectives and approaches indicating the extent to which the proposed activity suggests and explores creative, original, and potentially transformative concepts; and
3. Expected broader impacts of the proposed research including societal benefits and the potential long-term impacts on developing country agriculture.

**Both the intellectual merit and the anticipated broader impacts must be addressed or the proposal will be returned without review.** See Section VI. of this solicitation for additional information. The **potentially transformative** aspects of the proposed research should be addressed, as appropriate (<http://www.nsf.gov/pubs/2007/in130/in130.jsp>). Please consult <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf> for additional information about broader impacts.

**Project Description (maximum 15 pages, including figures and tables):** In addition to the standard description in the GPG, the guidelines below should be followed, noting that the page allowances listed are part of the overall 15-page maximum:

1. Describe, with reference to appropriate published background material, the constraint(s) to developing world agriculture to be addressed and make clear how the proposed research would provide solutions to these constraints. Pay special attention to integrating the broader impacts of the research into the entire project description, in particular, making clear how outcomes of a successful project would impact smallholder agriculture.
2. Provide a clear description of the intellectual aspects of any collaborations among the US and international partners and how they synergize to advance the research and education goals. The unique contributions expected from each collaborator should be outlined.
3. The key research elements should be outlined clearly. ***Use of innovative approaches that involve state-of-the-art science is particularly encouraged.***
4. Description of outcomes from prior NSF support following the GPG guidelines is only required for the PI or US Co-PIs.

**References Cited:** Indicate with an asterisk any cited publications that resulted from prior research funded by NSF for the PI, or Co-PI when following the GPG guidelines for all references cited.

**Biographical Sketches (2 pages each):** Biographical sketches following the GPG guidelines must be listed for the PI, Co-PIs and each of the Senior Personnel listed on the Project Summary page, both US and non-US. Please limit the overall number of biographical sketches to 10, prioritizing as required.

**Budget and Budget Justification:** (maximum of 6 pages for the budget justification)

1. If a non-US subawardee institution does not separate fringe benefits (F&A) from the total salary, please indicate in the Budget Justification that the salary requested includes fringe benefits
2. Travel: Funds to cover the estimated cost of attendance of the PI and up to one Co-PI at the annual awardee meeting (location TBD, within the US) should be requested.
3. Subawards: All subawards should be totaled on this line. A separate budget must be submitted for each subaward (maximum 3 pages per budget) that is consistent with the GPG. All budgets must be in US dollars.
4. Non-US subawardees may not request indirect costs unless evidence is provided as a Single Copy Document that the foreign grantee has a previously negotiated rate agreement with a US Federal Agency that has a practice of negotiating rates with foreign entities.

Non-US subawardees that do not have a US Federal Agency negotiated indirect cost rate agreement may claim costs associated with compliance under direct costs (G.6 Other) as long as the specific items are described in the Budget Justification. Eligible costs are limited to 8% of direct costs and may include, but are not limited to, the following:

- Financial record keeping;
- Audits of financial records;
- Project management;
- Acquisition of permits, licenses, import or export documents required to carry out the proposed research;
- Project-specific costs for critical research services (e.g., special IT access, extraordinary water or utility costs);
- US visas required for visits associated with project activities.

*Organizations may not claim both indirect costs and the direct cost of compliance.*

5. Within the budget narrative, US lead institutions should explain what resources will be allocated to oversight, monitoring, and, as needed, education for non-US subawardees to comply with requirements related to financial accountability and research ethics.

Proposers are strongly encouraged to contact a Program Director with any questions regarding cost eligibility.

**Current and Pending Support:** Current and Pending Support following the GPG guidelines must be listed for the PI, Co-PIs and each of the Senior Personnel (domestic and foreign) listed on the Project Summary page.

**Facilities, Equipment and Other Resources:** Provide a description of available facilities and priorities for their use for all key domestic and foreign institutions.

**Special Information and Supplementary Documentation:** Include the following materials in addition to Project Description. These materials should be labeled clearly and included in the **Supplementary Documents** section of FastLane. Provide only the allowable and applicable items as noted in the GPG and in this section. Include the materials in the FastLane submission by uploading them into the "Supplementary Docs" module of the FastLane system.

**(A-1) Sharing of Results and Management of Intellectual Property (maximum 3 pages):** Describe the management of intellectual property rights related to the proposed project, including plans for sharing data, information, materials, and/or any plans for protection of technologies or new devices resulting from the award with specific attention to the implications of data access for developing countries. This plan must be specific about the nature of the results to be shared, the timing and means of release, and any constraints on release. The proposed plan must take into consideration the following conditions where applicable:

- Nucleic acid sequences must be released according to the currently accepted community standard (e.g. Bermuda/Ft. Lauderdale agreement) to public databases (GenBank, if applicable), as soon as they are assembled and the quality checked against a stated, pre-determined quality standard.
- Proposals that would develop genome-scale expression data through approaches such as microarrays should meet community standards for these data (for example, Minimum Information about a Microarray Experiment or MIAME standards). The community databases (e.g. Gene Expression Omnibus) into which the data would be deposited, in addition to any project database(s) should be indicated.
- If the proposed project would produce community resources (biological materials, software, etc.), NSF encourages that they be made available as soon as their quality is checked to satisfy the specifications approved prior to funding. The timing of release should be stated clearly in the proposal. The resources produced must be available to all segments of the scientific community, including industry. A reasonable charge is permissible, but the fee structure must be outlined clearly in the proposal. If accessibility differs between industry and the academic community, the differences must be clearly spelled out. If a Material Transfer Agreement is required for release of project outcomes, the terms must be described in detail.
- When the project involves the use of proprietary data or materials from other sources, the data or materials resulting from BREAD-funded research must be readily available without any restrictions to the users of such data or materials (no reach-through rights). The terms of any usage agreements should be stated clearly in the proposal.
- Budgeting and planning for short-term and long-term distribution of the project outcomes must be described in the proposal. If a fee is to be charged for distribution of project outcomes, the details should be described clearly in the proposal. Letters of commitment should be provided from databases or stock centers that would distribute project outcomes, including an indication of what activities would be undertaken and funds needed for these activities (if any).
- The project should be aware of, and abide by, the general policies of NSF with respect to the patenting and licensing of any new technologies or devices that may be generated in the course of the project (see Award & Administration Guide, Chapter VI Section B. Intellectual Property).
- In case of a multi-institutional proposal, the lead institution is responsible for coordinating and managing the intellectual property resulting from the BREAD award. Institutions participating in multi-institutional projects should formulate a coherent plan for the project prior to submission of the proposal.

**(A-2) Project Management Plan (maximum 3 pages):** Projects involving more than one investigator and/or more than one institution must provide a description of the management plan for coordinating activities.

- This description should include plans for internal means of communication, coordination of data and information management, evaluation and assessment of progress, allocation of funds and personnel and other specific issues relevant to the proposed activities.
- For proposals with more than one investigator, a table summarizing the role of each investigator is required. The exact time commitment of each key project member should be indicated in the management plan, regardless of any request for his/her salary from NSF.
- A letter expressing an intent to collaborate is required from any non-US subawardee institution or any non-US scientist listed as a Co-PI who would not receive a sub-award, to be filed as a Supplementary Document.
- For proposals involving international travel, describe the process for US travelers to obtain any required visas and, through the submitting institution, for providing documentation in support of US visas for foreign counterparts needing to travel to the United States as part of the project. The PI and lead institution are also responsible for obtaining research permits and import/export documents where necessary. PIs should review NSF's web page "Information for US Travelers" <http://www.nsf.gov/od/ose/for-travelers-main.jsp>. Among other things, this page includes information regarding the collection of genetic resources outside the US.

**(A-3) Oversight Plan (maximum 3 pages):** Projects with subawards must provide a description of the lead institution's Oversight Plan for those subawards, including:

- Ensuring financial accountability, including the monitoring of expenditures and reporting on outcomes, for all subawardees. In this regard, the submitting institution should also provide a description of any past experiences in dealing with subawards to foreign institutions, particularly in the country(ies) where subawards would be made in this proposal.
- Ensuring compliance with regulations for the use of recombinant DNA, microbes, transgenic plants or animals, including any work involving vertebrate animals (see GPG Chapter II.D.6).
- Ensuring compliance with regulations relating to the US Agricultural Bioterrorism Act of 2002 ([http://www.aphis.usda.gov/programs/ag\\_selectagent/](http://www.aphis.usda.gov/programs/ag_selectagent/)).
- Adherence to common principles for the responsible conduct of research and the investigation of research misconduct allegations (as reference, see OECD Global Science Forum materials at [http://www.oecd.org/document/13/0,3343,en\\_2649\\_34319\\_42713613\\_1\\_1\\_1\\_1,00.html](http://www.oecd.org/document/13/0,3343,en_2649_34319_42713613_1_1_1_1,00.html) and NIH Fogarty International Center materials at <http://bms.brown.edu/fogarty/codes.htm>).
- BREAD does not anticipate the use of any human subjects in proposed research, and if any is anticipated, the PI must contact the Program Officer of BREAD for advice.

**(A-4) Plans for Dissemination of Project Outcomes (maximum 3 pages):** Provide details for how the project outcomes will be

disseminated, including timing and location for deposition of materials and/or data into public repositories (stock centers, databases). For software, indicate whether it will be open source and describe the proposed terms for access and use. For devices, indicate how and where the plans will be made available and under what terms. The plans should also consider the international context of the work, e.g. creating easily accessible and readable web pages, making journal publications easily accessible to developing countries, and/or fostering creative relationships with ListServes and other forms of media that cover developing world issues. The plans should include letters of commitment from databases or stock centers that would be asked to distribute project outcomes, if applicable.

**(A-5) Plans for Postdoctoral Mentoring (maximum 1 page):** All proposals that include funding to support postdoctoral researchers must include a description of the mentoring activities that will be provided for such individuals, and shall ensure that this part of the proposal is evaluated under the Foundation's broader impacts merit review criterion. Mentoring activities may include career counseling, training in preparing grant proposals, guidance on ways to improve teaching skills, and training in research ethics.

**(A-6) Plans for Undergraduate and Graduate Student Mentoring (maximum 1 page):** All proposals that include funding to support undergraduate or graduate students must include a description of the mentoring activities that will be provided for such individuals, and shall ensure that this part of the proposal is evaluated under the Foundation's broader impacts merit review criterion.

**Any material not specifically requested or in excess of the page allowances will be discarded prior to review.** It is the submitting institution's responsibility to ensure that the proposal is compliant with the guidelines. Non-compliant proposals may be returned without review.

#### Single Copy Documents:

**Conflict of Interest Document:** A single integrated document (in table or spreadsheet form only) should be uploaded into the **Single Copy Documents (not Supplementary Documents)** section of FastLane at the time of proposal submission. Hard copies or e-mail copies will not be accepted. The document should consist of a list in the form of a single alphabetized table, with the full names (Last name, first name, middle initial) of all people having a conflict of interest with any US or non-US senior personnel and any named personnel member whose salary is requested in the project budget. Conflicts to be identified are (1) Ph.D. thesis advisors or advisees, (2) collaborators or co-authors for the past 48 months, including postdoctoral advisors and advisees, (3) co-editors of a journal, compendium, or conference proceeding for the past 24 months and (4) any other individuals or institutions with which the investigator has financial ties (please specify type). Members of current Advisory Committee or speakers who received reimbursement for travel or honoraria should be included in this last category.

In addition to the Conflict of Interest Document, other correspondence to the program not intended to be sent to reviewers such as a list of potential reviewers can be sent as Single Copy Documents. Please note that key project personnel may be required, prior to an award decision, to submit copies of any intellectual property agreements or material transfer agreements they have signed, or are planning to sign, that would impact the unrestricted and timely distribution of the outcomes of the NSF-funded research. Submission of a Single Copy Document will allow these documents to be reviewed by the NSF officials only, and they will remain confidential.

Prior Negotiated Indirect Cost Rate. If a non-US institution proposed as a subawardee has a negotiated indirect cost rate with a US Government Agency, provide substantiation of this rate as a Single Copy Document.

#### Checklist for Proposal Preparation

- Title begins "BREAD:..."
- Project Summary contains all requested information, including broader impacts of the proposed work.
- Project Description is 15 pages or less in length, including figures, tables, and discussion of societal impacts.
- References Cited includes publications resulting from prior research funded by NSF (marked\*).
- Biographical Sketches (2 pages each) included for PI, Co-PIs and Senior Personnel listed in the Project Summary.
- Budget and budget justification, including separate budgets and budget justifications for each subawardee institution. Requests for travel to annual BREAD awardee meeting should also be included.
- Current and Pending Support Statements included for PI, Co-PIs and Senior Personnel listed in the Project Summary.
- Facilities, Equipment and Other Resources for all key domestic and foreign institutions
- Sections (A-1), (A-2), (A-3), (A-4), (A-5), and (A-6) uploaded in Supplementary Documents
- Supplementary documents include letters of commitment from databases or stock centers that would distribute project outcomes, if applicable.
- No general letters of support are included in Supplementary Documents; however a letter expressing an intent to collaborate is required from any non-US subawardee institution or any non-US scientist listed as a Co-PI who would not receive a sub-award.
- Conflict of Interest list uploaded as a single integrated table or spreadsheet into Single Copy Documents.
- Prior negotiated indirect cost rate uploaded as a Single Copy Document, as applicable.

This checklist is not intended to be an all-inclusive repetition of the required proposal contents and associated proposal preparation guidelines. It is, however, meant to highlight certain critical items so they will not be overlooked when the proposal is prepared.

Proposers are reminded to identify the program solicitation number (NSF 09-566) in the program solicitation block on the NSF Cover Sheet For Proposal to the National Science Foundation. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

## B. Budgetary Information

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**Cost Sharing:** Cost sharing is not required under this solicitation.

**Indirect Cost (F&A) Limitations:** Indirect cost limitations apply to non-US subaward institutions. Please see the full text of this solicitation for further information.

**Other Budgetary Limitations:** No indirect costs are allowed on subawards to non-US institutions unless they have previously negotiated an indirect cost rate with a US Government agency. See Proposal Preparation Instructions section on Budget and Budget Justification for details on allowable costs of compliance.

## C. Due Dates

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- **Letter of Intent Due Date(s) (required)** (due by 5 p.m. proposer's local time):



August 05, 2009

- **Full Proposal Deadline(s)** (due by 5 p.m. proposer's local time):

September 09, 2009

Full proposals must be received no later than 5:00 p.m. local time on the due date. Proposals received after this time will be returned without review.

## D. FastLane Requirements

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Proposers are required to prepare and submit all proposals for this program solicitation through use of the NSF FastLane system. Detailed instructions regarding the technical aspects of proposal preparation and submission via FastLane are available at: <http://www.fastlane.nsf.gov/a1/newstan.htm>. For FastLane user support, call the FastLane Help Desk at 1-800-673-6188 or e-mail [fastlane@nsf.gov](mailto:fastlane@nsf.gov). The FastLane Help Desk answers general technical questions related to the use of the FastLane system. Specific questions related to this program solicitation should be referred to the NSF program staff contact(s) listed in Section VIII of this funding opportunity.

*Submission of Electronically Signed Cover Sheets.* The Authorized Organizational Representative (AOR) must electronically sign the proposal Cover Sheet to submit the required proposal certifications (see Chapter II, Section C of the [Grant Proposal Guide](#) for a listing of the certifications). The AOR must provide the required electronic certifications within five working days following the electronic submission of the proposal. Further instructions regarding this process are available on the FastLane Website at: <https://www.fastlane.nsf.gov/fastlane.jsp>.

## VI. NSF PROPOSAL PROCESSING AND REVIEW PROCEDURES

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Proposals received by NSF are assigned to the appropriate NSF program where they will be reviewed if they meet NSF proposal preparation requirements. All proposals are carefully reviewed by a scientist, engineer, or educator serving as an NSF Program Officer, and usually by three to ten other persons outside NSF who are experts in the particular fields represented by the proposal. These reviewers are selected by Program Officers charged with the oversight of the review process. Proposers are invited to suggest names of persons they believe are especially well qualified to review the proposal and/or persons they would prefer not review the proposal. These suggestions may serve as one source in the reviewer selection process at the Program Officer's discretion. Submission of such names, however, is optional. Care is taken to ensure that reviewers have no conflicts of interest with the proposal.

### A. NSF Merit Review Criteria

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All NSF proposals are evaluated through use of the two National Science Board (NSB)-approved merit review criteria: intellectual merit and the broader impacts of the proposed effort. In some instances, however, NSF will employ additional criteria as required to highlight the specific objectives of certain programs and activities.

The two NSB-approved merit review criteria are listed below. The criteria include considerations that help define them. These considerations are suggestions and not all will apply to any given proposal. While proposers must address both merit review criteria, reviewers will be asked to address only those considerations that are relevant to the proposal being considered and for which the reviewer is qualified to make judgements.

#### **What is the intellectual merit of the proposed activity?**

How important is the proposed activity to advancing knowledge and understanding within its own field or across different fields? How well qualified is the proposer (individual or team) to conduct the project? (If appropriate, the reviewer will comment on the quality of the prior work.) To what extent does the proposed activity suggest and explore creative, original, or potentially transformative concepts? How well conceived and organized is the proposed activity? Is there sufficient access to resources?

#### **What are the broader impacts of the proposed activity?**

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, disability, 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?

Examples illustrating activities likely to demonstrate broader impacts are available electronically on the NSF website at: <http://www.nsf.gov/pubs/gpg/broaderimpacts.pdf>.

Mentoring activities provided to postdoctoral researchers supported on the project, as described in a one-page supplementary document, will be evaluated under the Broader Impacts criterion.

NSF staff also will give careful consideration to the following in making funding decisions:

#### ***Integration of Research and Education***

One of the principal strategies in support of NSF's goals is to foster integration of research and education through the programs, projects, and activities it supports at academic and research institutions. These institutions provide abundant opportunities where individuals may concurrently assume responsibilities as researchers, educators, and students and where all can engage in joint efforts that infuse education with the excitement of discovery and enrich research through the diversity of learning perspectives.

#### ***Integrating Diversity into NSF Programs, Projects, and Activities***

Broadening opportunities and enabling the participation of all citizens -- women and men, underrepresented minorities, and persons with disabilities -- is essential to the health and vitality of science and engineering. NSF is committed to this principle of diversity and deems it central to the programs, projects, and activities it considers and supports.

#### Additional Review Criteria:

- *International Collaboration:* Proposers are strongly encouraged to include one or more international collaborators as appropriate for the proposed research. Collaborations are encouraged that would build on the specific knowledge, local resources or agricultural needs of the international participants. Where applicable, proposed research activities should be coordinated with similar efforts in other countries to maximize efficiency and avoid unnecessary duplication of effort.
- *Data Sharing:* Proposers are encouraged to consider project outcomes in the context of the broader international community and ensure maximal accessibility and visibility to all. Outcomes are expected to meet current community standards for genomics data and be deposited in long-lived community databases where appropriate.
- *Integration of Research and Education and Broadening Participation:* Activities supported through the NSF-BMGF Program should provide an ideal environment for training young scientists in modern research technologies, introducing them to new paradigms in biology, and promoting increased participation by members of under-represented groups. NSF expects proposers to take advantage of the unique opportunities the proposed project provides in terms of education and incorporate these into the plan at a scale that is commensurate with the scale and scope of the proposed activity. Focused activities that fit well with the specific opportunities offered by the project would be viewed as a strength. However, projects that focus primarily on education or training are beyond the scope of the program and may be returned without review. Proposers are strongly encouraged to contact a Program Director for additional guidance.
- *Societal Impacts:* Issues related to societal impact, including implications for developing country agriculture, should be addressed as an integral part of the proposal. These may be integrated into an education and/or outreach activity designed to communicate the significance of the outcomes to the end-users.

## B. Review and Selection Process

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Proposals submitted in response to this program solicitation will be reviewed by Ad hoc Review and/or Panel Review.

Reviewers will be asked to formulate a recommendation to either support or decline each proposal. The Program Officer assigned to manage the proposal's review will consider the advice of reviewers and will formulate a recommendation.

After scientific, technical and programmatic review and consideration of appropriate factors, the NSF Program Officer recommends to the cognizant Division Director whether the proposal should be declined or recommended for award. NSF is striving to be able to tell applicants whether their proposals have been declined or recommended for funding within six months. The time interval begins on the deadline or target date, or receipt date, whichever is later. The interval ends when the Division Director accepts the Program Officer's recommendation.

A summary rating and accompanying narrative will be completed and submitted by each reviewer. In all cases, reviews are treated as confidential documents. Verbatim copies of reviews, excluding the names of the reviewers, are sent to the Principal Investigator/Project Director by the Program Officer. In addition, the proposer will receive an explanation of the decision to award or decline funding.

In all cases, after programmatic approval has been obtained, the proposals recommended for funding will be forwarded to the Division of Grants and Agreements for review of business, financial, and policy implications and the processing and issuance of a grant or other agreement. Proposers are cautioned that only a Grants and Agreements Officer may make commitments, obligations or awards on behalf of NSF or authorize the expenditure of funds. No commitment on the part of NSF should be inferred from technical or budgetary discussions with a NSF Program Officer. A Principal Investigator or organization that makes financial or personnel commitments in the absence of a grant or cooperative agreement signed by the NSF Grants and Agreements Officer does so at their own risk.

## VII. AWARD ADMINISTRATION INFORMATION

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### A. Notification of the Award

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Notification of the award is made to *the submitting organization* by a Grants Officer in the Division of Grants and Agreements. Organizations whose proposals are declined will be advised as promptly as possible by the cognizant NSF Program administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator. (See Section VI.B. for additional information on the review process.)

### B. Award Conditions

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An NSF award consists of: (1) the award letter, which includes any special provisions applicable to the award and any numbered amendments thereto; (2) the budget, which indicates the amounts, by categories of expense, on which NSF has based its support (or otherwise communicates any specific approvals or disapprovals of proposed expenditures); (3) the proposal referenced in the award letter; (4) the applicable award conditions, such as Grant General Conditions (GC-1); \* or Research Terms and Conditions \* and (5) any announcement or other NSF issuance that may be incorporated by reference in the award letter. Cooperative agreements also are administered in accordance with NSF Cooperative Agreement Financial and Administrative Terms and Conditions (CA-FATC) and the applicable Programmatic Terms and Conditions. NSF awards are electronically signed by an NSF Grants and Agreements Officer and transmitted electronically to the organization via e-mail.

\*These documents may be accessed electronically on NSF's Website at [http://www.nsf.gov/awards/managing/award\\_conditions.jsp?org=NSF](http://www.nsf.gov/awards/managing/award_conditions.jsp?org=NSF). Paper copies may be obtained from the NSF Publications Clearinghouse, telephone (703) 292-7827 or by e-mail from [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov).

More comprehensive information on NSF Award Conditions and other important information on the administration of NSF awards is contained in the *NSF Award & Administration Guide* (AAG) Chapter II, available electronically on the NSF Website at [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=aag](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=aag).

## C. Reporting Requirements

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For all multi-year grants (including both standard and continuing grants), the Principal Investigator must submit an annual project report to the cognizant Program Officer at least 90 days before the end of the current budget period. (Some programs or awards require more frequent project reports). Within 90 days after expiration of a grant, the PI also is required to submit a final project report, and a project outcomes report for the general public.

Failure to provide the required annual or final project reports, or the project outcomes report will delay NSF review and processing of any future funding increments as well as any pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

PIs are required to use NSF's electronic project-reporting system, available through FastLane, for preparation and submission of annual and final project reports. Such reports provide information on activities and findings, project participants (individual and organizational) publications; and, other specific products and contributions. PIs will not be required to re-enter information previously provided, either with a proposal or in earlier updates using the electronic system. Submission of the report via FastLane constitutes certification by the PI that the contents of the report are accurate and complete. The project outcomes report must be prepared and submitted using Research.gov. This report serves as a brief summary, prepared specifically for the public, of the nature and outcomes of the project. This report will be posted on the NSF website exactly as it is submitted by the PI.

Additional reporting requirements, including financial and scientific reports, will be detailed in the award letter.

## VIII. AGENCY CONTACTS

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General inquiries regarding this program should be made to:

- Diane Jofuku Okamuro, 690N, telephone: (703) 292-4400, email: [BREAD-WG@nsf.gov](mailto:BREAD-WG@nsf.gov)

For questions related to the use of FastLane, contact:

- FastLane Help Desk, telephone: 1-800-673-6188; e-mail: [fastlane@nsf.gov](mailto:fastlane@nsf.gov).
- Maya S. Anderson, 690N, telephone: (703) 292-4400, email: [BREAD-WG@nsf.gov](mailto:BREAD-WG@nsf.gov)

## IX. OTHER INFORMATION

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The NSF Website provides the most comprehensive source of information on NSF Directorates (including contact information), programs and funding opportunities. Use of this Website by potential proposers is strongly encouraged. In addition, National Science Foundation Update is a free e-mail subscription service designed to keep potential proposers and other interested parties apprised of new NSF funding opportunities and publications, important changes in proposal and award policies and procedures, and upcoming NSF Regional Grants Conferences. Subscribers are informed through e-mail when new publications are issued that match their identified interests. Users can subscribe to this service by clicking the "Get NSF Updates by Email" link on the [NSF web site](#).

Grants.gov provides an additional electronic capability to search for Federal government-wide grant opportunities. NSF funding opportunities may be accessed via this new mechanism. Further information on Grants.gov may be obtained at <http://www.grants.gov>.

## ABOUT THE NATIONAL SCIENCE FOUNDATION

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The National Science Foundation (NSF) is an independent Federal agency created by the National Science Foundation Act of 1950, as amended (42 USC 1861-75). The Act states the purpose of the NSF is "to promote the progress of science; [and] to advance the national health, prosperity, and welfare by supporting research and education in all fields of science and engineering."

NSF funds research and education in most fields of science and engineering. It does this through grants and cooperative agreements to more than 2,000 colleges, universities, K-12 school systems, businesses, informal science organizations and other research organizations throughout the US. The Foundation accounts for about one-fourth of Federal support to academic institutions for basic research.

NSF receives approximately 40,000 proposals each year for research, education and training projects, of which approximately 11,000 are funded. In addition, the Foundation receives several thousand applications for graduate and postdoctoral fellowships. The agency operates no laboratories itself but does support National Research Centers, user facilities, certain oceanographic vessels and Antarctic research stations. The Foundation also supports cooperative research between universities and industry, US participation in international scientific and engineering efforts, and educational activities at every academic level.

*Facilitation Awards for Scientists and Engineers with Disabilities* provide funding for special assistance or equipment to enable persons with disabilities to work on NSF-supported projects. See Grant Proposal Guide Chapter II, Section D.2 for instructions regarding preparation of these types of proposals.

The National Science Foundation has Telephonic Device for the Deaf (TDD) and Federal Information Relay Service (FIRS) capabilities that enable individuals with hearing impairments to communicate with the Foundation about NSF programs, employment or general information. TDD may be accessed at (703) 292-5090 and (800) 281-8749, FIRS at (800) 877-8339.

The National Science Foundation Information Center may be reached at (703) 292-5111.

The National Science Foundation promotes and advances scientific progress in the United States by competitively awarding grants and cooperative agreements for research and education in the sciences, mathematics, and engineering.

To get the latest information about program deadlines, to download copies of NSF publications, and to access abstracts of awards, visit the NSF Website at <http://www.nsf.gov>

- **Location:** 4201 Wilson Blvd. Arlington, VA 22230
- **For General Information** (NSF Information Center): (703) 292-5111
- **TDD (for the hearing-impaired):** (703) 292-5090
- **To Order Publications or Forms:**
  - Send an e-mail to: [nsfpubs@nsf.gov](mailto:nsfpubs@nsf.gov)
  - or telephone: (703) 292-7827
- **To Locate NSF Employees:** (703) 292-5111

## PRIVACY ACT AND PUBLIC BURDEN STATEMENTS

The information requested on proposal forms and project reports is solicited under the authority of the National Science Foundation Act of 1950, as amended. The information on proposal forms will be used in connection with the selection of qualified proposals; and project reports submitted by awardees will be used for program evaluation and reporting within the Executive Branch and to Congress. The information requested may be disclosed to qualified reviewers and staff assistants as part of the proposal review process; to proposer institutions/grantees to provide or obtain data regarding the proposal review process, award decisions, or the administration of awards; to government contractors, experts, volunteers and researchers and educators as necessary to complete assigned work; to other government agencies or other entities needing information regarding applicants or nominees as part of a joint application review process, or in order to coordinate programs or policy; and to another Federal agency, court, or party in a court or Federal administrative proceeding if the government is a party. Information about Principal Investigators may be added to the Reviewer file and used to select potential candidates to serve as peer reviewers or advisory committee members. See Systems of Records, NSF-50, "Principal Investigator/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004), and NSF-51, "Reviewer/Proposal File and Associated Records," 69 Federal Register 26410 (May 12, 2004). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

An agency may not conduct or sponsor, and a person is not required to respond to, an information collection unless it displays a valid Office of Management and Budget (OMB) control number. The OMB control number for this collection is 3145-0058. 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 the burden estimate and any other aspect of this collection of information, including suggestions for reducing this burden, to:

Suzanne H. Plimpton  
Reports Clearance Officer  
Division of Administrative Services  
National Science Foundation  
Arlington, VA 22230

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