

Report to the National Science Board
on the
National Science Foundation's
Merit Review System
Fiscal Year 1999



FY 1999 Report on the NSF Merit Review System

TABLE OF CONTENTS

HIGHLIGHTS

1.	<u>Proposals and Awards</u>	3
	Competitively Reviewed Proposals, Awards and Funding Rates	3
	Characteristics of Principal Investigators	4
	Award Amounts	5
2.	<u>Methods of Proposal Review</u>	6
	Review Processes Used at NSF	6
	Reviews and Reviewers	8
	Reviewer Proposal Ratings	9
	NSF Program Officers	10
	Assuring Objectivity in the Merit Review Process	11
3.	<u>Other Issues Related to Merit Review</u>	12
	Committee of Visitors (COV)	12
	Government Performance and Results Act (GPRA)	13
	Use of Preliminary Proposals	14
	Cost Sharing Policy Revision	15
	Small Grants for Exploratory Research (SGER)	15
	Accomplishment Based Renewals and Creativity Extensions	16
	Exemptions to the Merit Review Process	17

FY 1999 Report on the NSF Merit Review System

HIGHLIGHTS

1. During FY 1999 NSF took action on 28,504 competitively reviewed proposals, and provided funding to 9,112 of them. This resulted in an overall funding rate of 32 percent. These numbers have changed very little during the past five years. In FY 1999, Directorate funding rates ranged from 27 percent to 42 percent.
2. The funding rates for proposals from minority Principal Investigators (PIs) were below the NSF average in FY 1999, and have been for seven of the past eight years. The number of proposals received yearly from minority PIs has decreased by 5 percent since FY 1992.
3. Since FY 1992, the funding rates for proposals received from female PIs and male PIs have been similar. (In FY 1999 it was 31 percent for females compared to 32 percent for males.) The number of proposals received from female PIs increased by 19 percent during that seven year period.
4. There continues to be considerable disparity in the funding rates of proposals from “new PIs” and “prior PIs” (23 percent and 39 percent, respectively, in FY 1999).
5. The average and median award size increased by 3.3 percent and 3.5 percent respectively. In FY 1999 the average award size for research grants was \$92,788 and the median was \$73,335. In NSF’s FY 2001 Government Performance and Results Act (GPRA) Performance Plan, a specific goal is to increase the average annualized award size for research projects to \$108,000.
6. Since 1990, the percentage of NSF proposals reviewed by panel-only has increased from 36 to 47 percent, while the use of mail-only review has decreased from 33 to 18 percent. The use of mail-plus-panel review increased from 32 to 35 percent during this period. This may reflect a number of factors, such as the growing number of multidisciplinary proposals received and the declining response rate of mail reviewers.
7. NSF received a total of more than 246,000 reviews in FY 1999, for an average of 8.3 reviews per proposal. The response rate to mail review requests has decreased to 59 percent from 62 percent in FY 1998.
8. In FY 1999, over 8,000 proposals with average summary ratings between Very Good and Excellent were declined. The judgment of NSF staff is essential to making this difficult separation between awards and declines. The data also indicate that a large number of potentially fundable proposals are declined each year.
9. The use of preliminary proposals has increased in frequency over the past several years in NSF programs. In FY 1999, NSF acted on 1,594 preliminary proposals that were logged into the proposal processing system. Of these, NSF encouraged the submission of full proposals in 221 cases and discouraged submission in 1,373 cases.

FY 1999 Report on the NSF Merit Review System

Among the Federal agencies, NSF has a unique mission: to strengthen the overall health of U.S. science and engineering across a broad and expanding frontier. NSF invests in the best ideas from the most capable people, determined by competitive merit review. The merit review system is at the very heart of NSF's selection of the projects through which its mission is achieved. NSF evaluates proposals for research and education projects using two criteria: the intellectual merit of the proposed activity and the broader impacts of the proposed activity on society.

The *FY 1999 Report on the NSF Merit Review System* responds to a National Science Board (NSB) policy endorsed in 1977 and amended in 1984, requesting that the Director of the National Science Foundation (NSF) submit an annual report on the NSF proposal review system. This report provides summary information about levels of proposal and award activity and the process by which proposals are reviewed and awarded.

1. Proposals and Awards

Competitively Reviewed Proposals, Awards and Funding Rates

During FY 1999, NSF took action on 28,504 competitive, merit reviewed research and education proposals, as shown in **Text Figure 1**. The number of proposals reviewed annually by NSF has been reasonably stable at around 30,000 proposals since 1995.

NSF funding was awarded to 9,112 of the proposals, resulting in an overall funding rate of 32 percent. The number of awards made each year has varied between approximately 9,000 and 10,000. The overall funding rate has varied little since 1995. However, funding rates among directorates* varied considerably, ranging from 27 percent to 42 percent as shown in **Appendix Table 1**.

Text Figure 1
NSF Proposal, Award and Funding Rate Trends

	Fiscal Year				
	1995	1996	1997	1998	1999
Proposals	30,700	30,231	30,189	28,318	28,504
Awards	9,563	9,071	9,864	9,279	9,112
Funding Rate	31%	30%	33%	33%	32%

In addition to funding proposals that were competitively reviewed during FY 1999, NSF awarded 6,896 continuing grant increments (CGIs) based on proposals which had been competitively reviewed in earlier years. CGIs are funded in annual increments from current year

* The term "directorates" as used in this report, refers to NSF's seven programmatic directorates and the Office of Polar Programs.

appropriations. The CGI procedure complements the other major type of NSF award instrument – standard grants – where all funds for a multiple year project are obligated in the initial award. NSF policy limits the amount of next year’s CGI commitments to 65 percent of a program’s current fiscal year operating plan.

Characteristics of Principal Investigators

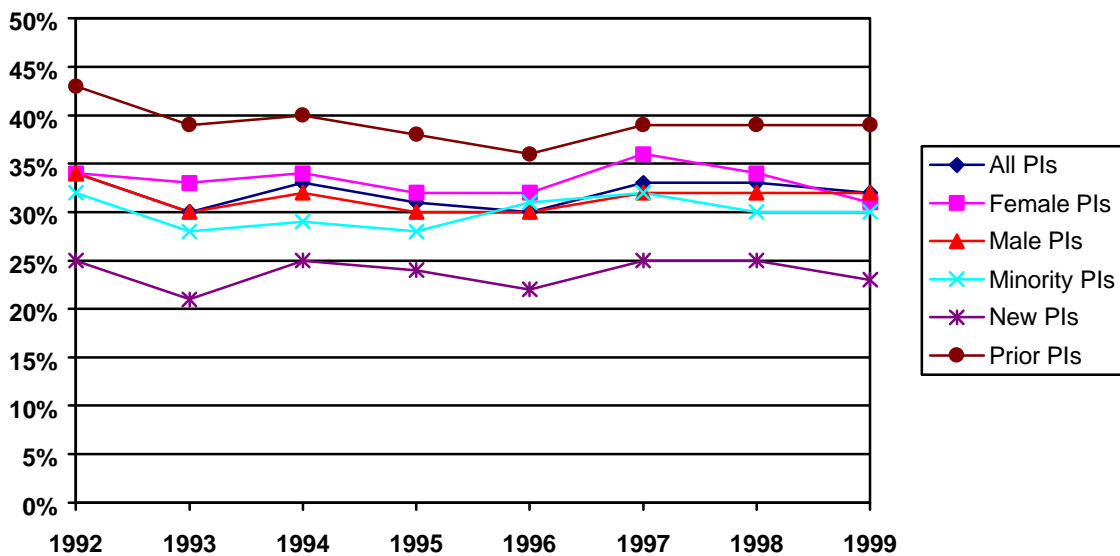
Trends in funding rate for all PIs, female and minority PIs, and prior and new PIs are shown in **Text Figure 2**. Proposals, awards, funding rates and trends by PI characteristics are presented in **Appendix Table 2**.

The differences in funding rates of proposals from female PIs and male PIs have been minor over the past few years. However, the funding rates for proposals from minority PIs have been below the overall NSF funding rate for seven of the past eight years.

The number of proposals received from female Principal Investigators (PIs) has increased by 19% since 1992, as shown in Appendix Table 2. The same has not been true for PIs from minority groups, which has decreased by 5%. During FY 1999, about 19 percent of competitively reviewed proposals were from female PIs down from 20 percent in FY 1998, and five percent were from minority PIs (level with FY 1998.)

Forty-one percent of the competitively reviewed proposals in FY 1999 were from PIs who had never received an NSF award (‘new PIs’), up slightly from FY 1998. There continues to be a wide disparity in the funding rates of "new PIs" and "prior PIs" (23 percent and 39 percent, respectively in FY 1999). As indicated in Appendix Table 2, in FY 1999 the number of awards to new PIs decreased from 3,041 to 2,675, or 12 percent.

Text Figure 2
Funding Rates by PI Characteristic



In order to encourage the proposal and award process to be open to new people and new ideas, NSF has established an FY 1999 GPRA performance goal of 30 percent of competitive research grants going to new investigators. The FY 1999 result was 27 percent. The FY 2000/01 goals will continue to be 30%. The Agency is committed to maintaining openness in the system and will strive to increase the percentage of awards to new investigators. NSF will explore whether the pool of new investigators is smaller than in previous years, whether they are submitting fewer proposals, etc., and use this information to design future strategies.

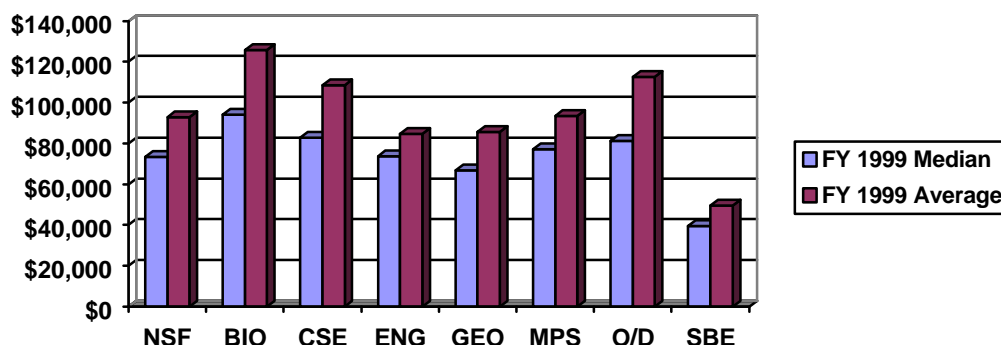
Award Amounts

The median annual award amount (adjusted for multiple year projects) among competitive research awards made during FY 1999 was \$73,335, a 3.5 percent increase from FY 1998. The average annualized award amount in FY 1999 was \$92,788, an increase of 3.3 percent from FY 1998. The difference between the median and average award amounts reflects the effect of numerous small awards on the median, and a few large awards for centers, facilities, and large systemic initiatives on the average award amount.

Award amounts have been consistent over the past decade, when adjusted to constant dollars as measured by the Consumer Price Index. There are considerable differences among directorates, as shown in **Text Figure 3**. Data on median and average award amounts from FY 1995-1999 are presented by directorate in **Appendix Table 3**.

Adequate award size is important both to getting high quality proposals and to ensuring that proposed work can be accomplished as planned. Larger awards also enable scientists and engineers to devote a greater portion of their time to research. In NSF's FY 2001 Government Performance and Results Act (GPRA) Performance Plan, a specific goal is to increase the average annualized award size for research projects to \$108,000, and the average award duration from 2.7 to 3 years.

**Text Figure 3: FY 1999
Award Amounts by Directorate
Competitively Reviewed Research Awards**



2. Methods of Proposal Review

The involvement of knowledgeable peers from outside the Foundation in the review of proposals is the keystone of NSF's proposal review system. Their judgements of the extent to which proposals address established criteria are vital for informing NSF staff and influencing funding recommendations. For this reason, NSF's system of proposal review can accurately be characterized as "merit review with peer evaluation."

Review Processes Used at NSF

NSF programs obtain external peer review by two principal methods, mail and panel. In addition to mail and panel reviews, site visits by NSF staff and external peers are often used to review proposals for large facilities, centers, and systemic reform initiatives. NSF program officers are given discretion in the specific use of review methods, subject to supervisory approval. For example, some programs try to manage proposal pressure by requiring submission of preliminary proposals. Review of preliminary proposals varies widely, ranging from non-binding advice from program officers to proposers, to recommendations from external reviewers. The use of preliminary proposals has increased in frequency over the past several years in NSF programs. In FY 1999, NSF acted on 1,594 official preliminary proposals that were logged into the proposal processing system. Of these, NSF encouraged the submission of full proposals in 221 cases and discouraged submission in 1,373 cases.

In "mail-only" reviews, peers are sent proposals and asked to submit written comments to NSF by postal mail, facsimile, electronic mail, or through FastLane, NSF's Web-based system for electronic proposal submission and review. These mail reviews are then used by the NSF program officer directly to support a recommendation for award or decline.

"Panel-only" review refers to the process of soliciting reviews only from those peers who meet in a panel review setting to discuss their reviews and provide advice directly to the program officer. Most programs that use this process provide proposals to panelists and receive their reviews prior to the panel meeting. Other programs provide panelists with access to the proposals at the beginning of the panel meeting, allowing them a period of time during which they prepare their reviews at the meeting.

Many proposals submitted to NSF are reviewed using some combination of these two processes ("mail-plus-panel" review). Those programs that employ the mail-plus-panel review process have developed several different configurations, such as:

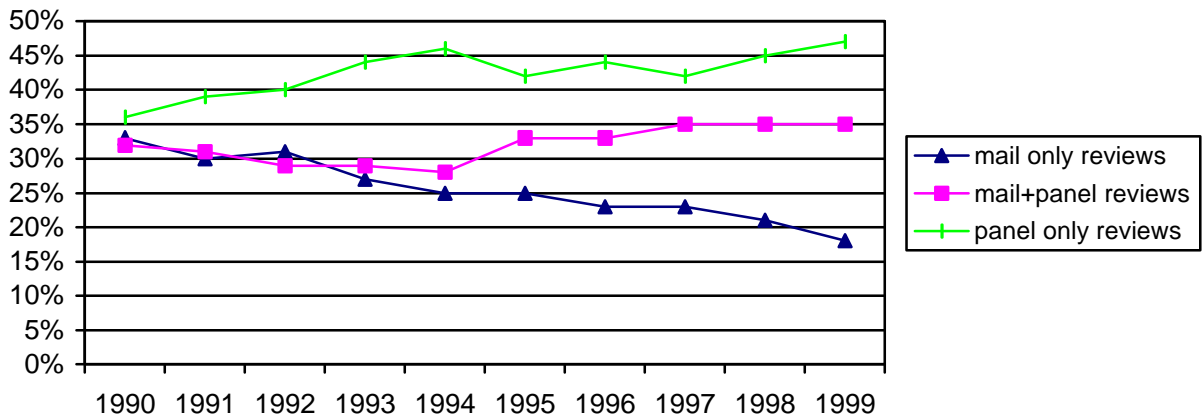
- A peer is asked to submit a written mail review and also serve as a panelist, in effect contributing two reviews for each proposal; and
- A peer is asked to participate only as a panelist, with responsibility only for reviewing and discussing mail reviews written by others and providing verbal and/or written advice to the program officer.

The use of various review processes has changed markedly over time. The percentage of NSF proposals reviewed by panel-only has increased from 36 to 47 percent of all proposals since FY 1990. There has been a steady decline in the use of mail-only review from 33 to 18 percent during the past decade. The use of mail-plus-panel review increased from 32 to 35 percent during

the past ten years. These trends are shown in **Text Figure 4**, and the corresponding data are presented in **Appendix Table 4**. These trends most likely result from the increasing complexity and multidisciplinary of proposals and the need to better manage the proposal workload.

Directorate-level data on the use of different review processes during FY 1999 are presented in **Appendix Table 5**. Directorates vary in their use of proposal review methods. Mail-plus-panel review was the most common review process used in the BIO, GEO, and SBE Directorates. Mail-only review was the predominant mode of review in MPS.

Text Figure 4
FY 1990-1999 Trend, NSF Review Method
(Percentage of Proposals)



Panel-only review was the most commonly used method in CISE, ENG and EHR. These trends have major implications for the way NSF conducts its business. For example, as indicated in **Text Figure 5**, there is a strong relationship between time to decision and type of review. In FY 1999, 65% of all proposals reviewed by panel-only were processed within six months, compared to 54% for mail-plus-panel and 50% for mail-only.

Text Figure 5
Time to Decision by Type
FY 1995 – 1999

FY	Review Method	0-6 Months	>6-9 Months	>9-12 Months	>12 Months
1999	Mail-plus-Panel	54%	36%	7%	3%
	Mail Only	50%	36%	10%	4%
	Panel Only	65%	27%	6%	1%
1998	Mail-plus-Panel	56%	36%	6%	2%
	Mail Only	42%	43%	12%	4%
	Panel Only	67%	27%	5%	1%
1997	Mail-plus-Panel	58%	34%	6%	3%
	Mail Only	42%	38%	12%	8%
	Panel Only	70%	25%	3%	2%
1996	Mail-plus-Panel	44%	40%	11%	4%
	Mail Only	35%	42%	15%	8%
	Panel Only	40%	48%	10%	2%
1995	Mail-plus-Panel	48%	40%	8%	5%
	Mail Only	39%	38%	13%	11%
	Panel Only	51%	38%	8%	3%

Note: FY 1999 numbers include 1,570 reviewed preproposals 1,554 were reviewed by panel and 16 by mail. Source: Custom program by Special Data Group, February 23, 2000.

Reviews and Reviewers

NSF policy states that each recommendation for final action on a proposal must be accompanied by at least three external reviews, unless the requirement has been waived under special circumstances (see, “Exemptions to the Merit Review Process,” below). The total numbers of reviews and the average numbers of reviews per proposal obtained by these different methods are presented in **Text Figure 6**. Some of this difference is reflected in the fact that panel counts refer to all the participants on a given panel, not just the lead reviewers.

Directorate-level data for FY 1999 are presented in **Appendix Table 6**. There is considerable variation in the number of reviews per proposal among the directorates, ranging from 15.7 (BIO) to 4.0 (ENG).

Text Figure 6
Reviews per Proposal, FY 1999

	All Methods	Mail-plus-Panel	Mail-Only	Panel-Only
# of Reviews	246,145	132,069	24,162	89,914
# of Proposals	29,564	10,324	5,292	13,948
Reviews per Proposal	8.3	12.8	4.6	6.4

Note: FY 1999 numbers includes 1,570 reviewed preproposals, 1,554 were reviewed by panel and 16 by mail. Source: Custom program by Special Data Group, February 23, 2000.

A growing number of reviews are submitted electronically through NSF's FastLane system. Of the 246,145 reviews submitted in FY 1999, 74,891, or 30 percent, were submitted through FastLane. In the first three months of FY 2000, 27,040 proposals were submitted through FastLane, compared to 11,648 for the same period in FY 1999. FastLane promises considerable workload reduction for both the reviewer community and the NSF staff.

Diversity of the reviewer pool is an important feature of the NSF merit review system. Reviewers from diverse backgrounds help ensure that a wide range of perspectives are taken into consideration in the review process. NSF emphasizes reviewer diversity through a variety of processes, including use of a large and expanding Foundation-wide reviewer database, explicit policy guidance, mandatory training for all program officers, and directorate-level initiatives.

NSF maintains a central electronic database of about 250,000 reviewers. For proposal decisions in FY 1999, 47,300 of these reviewers were sent one or more proposals for mail review, 30,700 reviewed at least one proposal by mail, and 8,300 reviewers served as panelists. In all, 51,900 individuals either served on a panel, were sent a proposal for mail review, or served in both functions. Of these reviewers, 16 percent were female, 77 percent were male, and for 7 percent the gender was unknown. The data for minorities is not of sufficient quality to publish.

Potential reviewers are identified from a variety of sources including applicant suggestions, references attached to proposals and published papers, and input from mail reviewers, panelists, and visiting scientists. During FY 1999, approximately 29,400 of the 250,000 records now in the reviewer database were either added or updated.

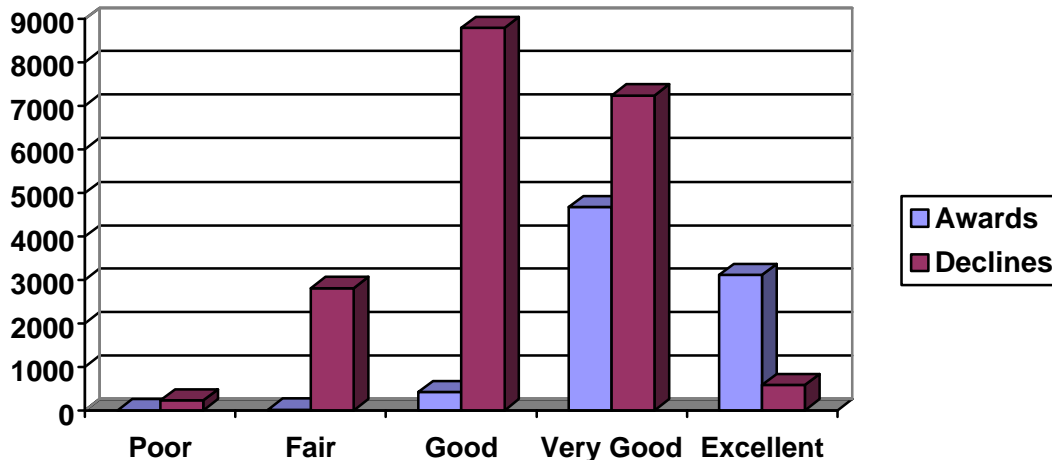
Participation in the peer review process is voluntary. Panelists are reimbursed for expenses; mail reviewers receive no financial compensation. In FY 1999, 59 percent of requests for mail reviews produced responses, which represents a decrease from the 62 percent response rate in FY 1998 and the 64 percent response rate that had been stable since 1991.

Reviewer Proposal Ratings

The NSF merit review system emphasizes reviewer narratives over summary ratings. Summary ratings are but one indicator of reviewer judgment of the proposal quality. The written narratives provided by reviewers, the deliberations by panel members, and the expert opinions provided by program officers are all important components of the merit review system. No one component is allowed to dominate over the others.

The distribution of average summary ratings of reviews for awarded and declined proposals is provided in **Text Figure 7**. Only those ratings provided for mail-only and mail-plus-panel reviewers have been included. Panel-only reviewers often submit comments without a summary rating. These data indicate considerable overlap among the average reviewer ratings of successful and unsuccessful proposals, most notably in the range of "very good" average ratings. The judgment of NSF staff is essential to making this difficult separation between awards and declines. The data also indicate that a large number of potentially fundable proposals are declined each year.

Text Figure 7
Distribution of Average Reviewer Ratings
(Number of Proposals, FY 1999)



NOTE: Excludes reviews submitted as written comments.

NSF Program Officers

The narrative comments and summary ratings provided by external reviewers are essential inputs in NSF’s system of merit review. Once received, these inputs inform the judgment of the program officers who formulate award and decline recommendations to NSF’s senior management. These program officers are scientists, engineers, and educators to whom NSF looks for expert judgment and program management. In making recommendations to award or decline proposals, these highly qualified individuals produce and manage a portfolio of awards addressing NSF’s strategic goals and related factors such as:

- Contributions to human resource and institutional infrastructure development,
- Support for “risky” proposals with potential for significant advances in a field,
- Encouragement of interdisciplinary activities, and
- Achievement of program-level objectives and initiatives.

The number of program officers employed by NSF has remained stable at around 400 for the past five years, despite increases in proposal complexity and general workload. Depending on their professional experience, program officers are classified as assistant program director, associate program director, or program director. They can be permanent NSF employees or temporary employees. Some temporary program officers are “on loan” as visiting scientists, engineers, and educators (VSEEs) for up to three years from their host institutions. Others are employed through grants to the home institutions under the terms of the Intergovernmental Personnel Act. The distribution of these program officers among these and other categories is presented in **Text Figure 8**.

Text Figure 8
Distribution of NSF Program Officers by Characteristics

	Assistant Program Directors	Associate Program Directors	Program Directors	Total
Total	13	29	371	413
Male	6 46.2%	21 72.4%	236 63.6%	263 63.7%
Female	7 53.8%	8 27.6%	135 36.4%	150 36.3%
Minority	1 7.7%	4 13.8%	68 18.3%	73 17.7%
White, Non-Hispanic	12 92.3%	25 86.2%	303 81.7%	340 82.3%
Permanent	10 76.9%	19 65.5%	195 52.5%	224 54.2%
VSEE	0 0.0%	3 10.4%	34 9.2%	37 9.0%
Temporary	2 15.4%	0 0.0%	43 11.6%	45 10.9%
IPA	1 7.7%	7 24.1%	99 26.7%	107 25.9%
Source: NSF Division of Human Resource Management Notes: VSEE: Individual employed as a Visiting Scientist, Engineer, or Educator (formerly termed "Rotator"). IPA: Individual employed under the Intergovernmental Personnel Act.				

Assuring Objectivity in the Merit Review Process

NSF program officers carefully check all proposals for potential conflict-of-interest and select expert outside reviewers with no apparent potential conflicts. All reviewers are instructed to declare potential conflicts. All program officers receive conflicts-of-interest training annually.

NSF policy includes several mechanisms that provide proposers with information on how the review process led to a recommendation, and on procedures for obtaining additional explanations for declinations. These policies help to ensure that NSF's review has been fair and reasonable, and that NSF maintains the openness, quality, and integrity of the merit review process.

Every proposer receives from the NSF program officer a description of the context in which the proposal was reviewed, along with an anonymous verbatim copy of each review that was considered in the review process. A declined PI may ask the cognizant program officer for additional clarification of the decision. If after considering this additional information a PI is not satisfied that the proposal was fairly handled and reasonably reviewed, he or she may request formal reconsideration from the cognizant Assistant Director (AD). This request can be based on the PI's perception of procedural errors or on disagreements over the substantive issues dealt with by reviewers. If the AD upholds the original action, the applicant's institution may request a second reconsideration from the Foundation's Deputy Director (O/DD).

On average, NSF annually declines over 20,000 proposals but receives, on average, only 40-50 requests for formal reconsideration. Most program-level decisions are upheld in the reconsideration process. Out of the 240 requests for formal reconsideration of declined proposals during the past six years, nine decisions have been reversed. The number of requests for formal reconsideration and resulting decisions at both the AD and O/DD levels from FY 1994 through FY 1999 are displayed in **Appendix Table 7**.

Each program officer's recommendation to award or decline a proposal is subject to a programmatic review by a higher level reviewing official (usually the division director), and an administrative review by a grants officer in the Office of Budget, Finance, and Award Management (BFA). All award recommendations in excess of \$1.5 million in any one project year or \$6 million over five years must be reviewed by the Director's Review Board (DRB). In FY 1999, awards in excess of a \$3 million commitment during a project year, or \$15 million over five years, required approval by the National Science Board.

Changes to the NSB threshold were approved by the NSB in July, 1999 and implemented on September 30, 1999, effective Fiscal Year 2000. The new threshold requires NSB approval of awards where the average annual award amount is 1% or more of the awarding directorate's prior year current plan.

3. Other Issues Related to Merit Review

Committees of Visitors (COV)

NSF regularly assesses performance of all aspects of the merit review system, comparing its efficiency, effectiveness, customer satisfaction and integrity against similar processes run by other organizations. For example, panels of external experts called Committees of Visitors (COVs) are convened to review the technical and managerial stewardship of NSF programs on a three-year cycle. COVs report on the integrity and efficiency of the processes for proposal review and the quality of results of NSF's programs in the form of outputs and outcomes that appear over time. The recommendations of COVs are reviewed by management and taken into consideration by NSF when evaluating existing programs and future directions for the Foundation.

In FY 1999, NSF's activities were organized into nearly 200 programs. In FY 1999, a total of 18 committees of visitors (COVs) met to conduct reviews of 82 programs, producing a total of 43 COV reports assessing the quality of program performance and outcome results. The number of COV reports is greater than the number of COVs because the COVs were organized into subgroups to produce reports covering more than one program. A list of all programs subject to review by a Committee of Visitors and the fiscal year of the most recent review is provided in **Appendix Table 10**.

Each COV must operate in accordance with the Federal Advisory Committee Act (FACA) of 1972. In compliance with FACA regulations, virtually all COVs are established as subcommittees of an existing chartered directorate advisory committee, and the COV report is reviewed and approved by the parent advisory committee. The cognizant assistant director (AD) provides the parent advisory committee with a written response to each COV report. The COV's

report and the AD's response are public documents; some have been publicized in the professional literature.

Government Performance and Results Act (GPRA)

The merit review system is at the very heart of NSF's selection of the projects through which its GPRA outcome goals are achieved. Hence, in NSF's new GPRA Strategic Plan, "*operating a credible, efficient merit review system*" is cited as a critical factor for success of the agency. Ensuring a credible, efficient system requires constant attention and openness to change. Two implementation strategies for accomplishing this are: (1) Regularly assess performance of all aspects of the merit review system, comparing its efficiency, effectiveness, customer satisfaction and integrity against similar processes run by other organizations; and (2) Promote the use of both merit review criteria (i.e. *intellectual merit* and *broader impacts*) in the evaluation of proposals.

In the FY 1999 GPRA Performance Plan, NSF's investment process goals focus on the means and strategies the Foundation uses to make investment decisions and shape its portfolio of awards in order to achieve its mission and desired outcome goals. Two of these goals (goals 6&7, described below) specifically addressed the use of merit review.

Goal 6: At least 90% of NSF funds will be allocated to projects reviewed by appropriate peers external to NSF and selected through a merit-based competitive process. (This is a government-wide goal for all federal science, space and technology funding agencies.)

Results: In FY 1999 NSF exceeded this goal, with 95% of project funds allocated to projects subjected to merit review. This goal will be maintained in FY 2000. NSF expects to exceed this government-wide goal again.

Goal 7: NSF performance in implementation of the new merit review criteria

Background: In 1997 the NSB approved new NSF merit review criteria. The two new review criteria are (1) What is the intellectual merit of the proposed activity; and (2) What are the broader impacts of the proposed activity? The guidance accompanying the new review criteria state that both criteria must be addressed in the evaluation of a proposal.

NSF's performance goal for the implementation of the new merit review criteria is stated in the alternative (narrative) GPRA format. NSF performance is:

- ***successful*** when reviewers address the elements of both generic review criteria appropriate to the proposal at hand and when program officers take the information provided into account in their decisions on awards; or
- ***minimally effective*** when reviews consistently use only a few of the suggested elements of the generic review criteria although others might be applicable.

Results: Largely successful, needs some improvement. For FY 1999, Committees of Visitors (COV's) and Advisory Committees (AC's) used the alternative format to judge how well NSF is

implementing the new criteria. In FY 1999, a total of 38 COV reports and 6 AC reports rated NSF programs on their use of the new merit review criteria. NSF was rated successful in achieving this goal in 33 COV reports and 3 AC reports.

One AC report gives NSF a qualified successful rating, and two AC reports rate NSF minimally effective in implementing this goal. In most cases where NSF was not fully successful, it was found that reviewers and applicants were not fully addressing both review criteria. This goal will be maintained for FY 2000.

Recent Progress: NSF has established guidelines in program announcements requiring applicants and reviewers to address these criteria in proposals and reviews. NSF has recently re-issued guidance to the applicants and reviewers, stressing the importance of using both criteria in the preparation and evaluation of proposals submitted to NSF. NSF is also taking additional steps to ensure that applicants address these criteria when reporting project results.

As part of the FY 1999 Performance Plan, the following language was added to NSF program announcements and included in the Grant Proposal Guide:

PIs should address the following elements in their proposal to provide reviewers with the information necessary to respond fully to the above-described NSF merit review criteria. NSF staff will give these elements careful consideration 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 -- are 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.

Use of Preliminary Proposals

The use of preliminary proposals has increased in frequency over the past several years in NSF programs. The intent of preliminary proposals is to limit the burden imposed on proposers, reviewers and NSF staff. Normally, preliminary proposals require only enough information to make fair and reasonable decisions regarding encouragement/discouragement of a full proposal. In FY 1999, NSF acted on 1,594 preliminary proposals that were officially logged into the proposal processing system. Of these, NSF encouraged the submission of full proposals in 221

cases and discouraged submission in 1,373 cases. Until now, there have not been NSF-wide policies for the use, review and tracking of preliminary proposals. However, the establishment of such policies is currently under discussion.

Cost Sharing Policy Revision

In accordance with Congressional requirements, NSF requires that each grantee share in the cost of NSF research projects resulting from unsolicited proposals. In addition to the statutory requirements, NSF can require cost sharing when it believes there is tangible benefit to the award recipient(s) (normally beyond the immediate term or scope of the NSF-supported activity).

In FY 1999, NSF revised its policy with respect to cost sharing. It took effect on 7 May 1999, when approved by the National Science Board. The revised policy set forth the following principle for how non-statutory cost sharing may be used as an eligibility factor in the receipt of proposals.

NSF cost sharing requirements beyond the statutory requirement will be clearly stated in the program announcement, solicitation or other mechanism, which generates proposals to the program. NSF-required cost sharing is considered an eligibility rather than review criterion.

This obviously has important implications for the proposal solicitation process and its implementation will be closely monitored. A new system to automate proposal solicitation preparation has helped support the use of clear, consistent language in this area.

Small Grants for Exploratory Research (SGER)

Since the beginning of FY 1990, the Small Grants for Exploratory Research (SGER) option has permitted program officers throughout the Foundation to make short-term (one to two years), small-scale (less than \$50 K) grants *without formal external review*. Characteristics of activities that can be supported by an SGER award include:

- Preliminary work on untested and novel ideas;
- Application of new approaches to “old” topics;
- Ventures into emerging research areas; and
- Narrow windows of opportunity for data collection, such as natural disasters and infrequent phenomena.

The SGER funding rate is much higher than for regular, competitively reviewed proposals in large part because potential SGER applicants are encouraged to contact an NSF program officer before submitting an SGER proposal to determine its appropriateness for the SGER funding option. As potential SGER applicants have become familiar with this practice, the SGER funding rate has increased from 55 percent in its first year (FY 1990) to 81 percent in FY 1999.

Additional details are shown in **Text Figure 9**.

Text Figure 9
Small Grants for Exploratory Research (SGER)

	Fiscal Years							
	1992	1993	1994	1995	1996	1997	1998	1999
Proposals	330	309	258	228	205	244	302	277
Awards	194	213	185	168	144	194	250	223
Funding Rate (%)	65	69	72	74	70	80	83	81

NSF management has been concerned by the decrease in SGER proposal pressure since the activity's inception in 1990. In response, Staff Memorandum O/D 97-06 (dated June 5, 1997) announced a three-year experiment that increases the SGER award limit from \$50,000 to \$100,000. Program officers were also given permission to grant six-month extensions and supplements of up to \$50,000 for extant SGER awards. (EHR and BIO elected not to offer these time extensions or supplements.)

Coincident with these policy changes, the downward trends in SGER proposal pressure and number of awards were reversed in FY 1998. NSF received 244 SGER proposals in FY 1997 and made 194 awards. NSF received 302 SGER proposals in FY 1998 and made 250 awards. Directorates vary in the degree to which their program officers discourage potential proposers from submitting inappropriate ideas as formal SGER proposals. As a result, FY 1998 funding rates for SGER proposals varied among directorates from 47 to 94 percent. Directorate-level data on SGER proposal pressure and funding rates are presented in **Appendix Table 8**.

The total amount awarded to SGERs in FY 1999 was \$12,293,477. The average SGER award amount in FY 1999 was \$55,128, a 27 percent increase relative to the FY 1997 average award amount of \$43,367. Despite these increases, the total NSF investment in SGERs remains less than one half of one percent of the operating budget for research and education, far below the five percent that program officers may commit to SGER awards. The history of SGER awards by directorate from FY 1997 to FY 1999 is presented in **Appendix Table 9**.

Accomplishment Based Renewals and Creativity Extensions

In addition to SGERs, NSF program officers may recommend *accomplishment based renewals* and *creativity extensions*.

An accomplishment-based renewal is a method that can be used by PIs to submit renewal proposals to NSF. In this type of renewal proposal, the project description is replaced by copies of no more than six reprints of publications resulting from the research supported by NSF (or research supported by other sources that is closely related to the NSF-supported research) during the preceding three- to five-year period. Of the six publications, two preprints (accepted for publication) may be included. In addition, a brief (not to exceed four pages) summary of plans for the proposed support period must be submitted. All other information required for NSF proposal submission remains the same.

A creativity extension is an extension of funding for up to two years for certain research grants. The objective of such extensions is to offer the most creative investigators an extended opportunity to attack adventurous, "high-risk" opportunities in the same general research area, but not necessarily covered by the original/current proposal. Special Creativity Extensions are initiated by the NSF Program Officer based on progress during the first two years of a three-year grant.

In 1999 there were 30 requests for accomplishment based renewals, 15 of which were awarded. There were also 48 creativity based extensions made to existing NSF grants.

Exemptions to the Merit Review Process

Authorized exemptions to the peer review process are listed in NSF Manual 10, Section 122 (**Attachment I**) and include routine award actions such as continuing grant increments and no-cost extensions. In special circumstances, the Director or designee may waive peer review requirements. Such waivers of peer review were granted 7 times during FY 1999; 5 for OIA, 1 for SBE and 1 for CISE.

Appendix Table 1

**Competitively Reviewed Proposals, Awards and Funding Rates
By Directorate, FY 1995 – 1999**

		Fiscal Year					Five-year	Five-year
		1995	1996	1997	1998	1999	Total	Average
NSF	Proposals	30,700	30,231	30,189	28,318	28,504	147,942	29,588
	Awards	9,563	9,071	9,864	9,279	9,112	46,889	9,378
	Funding Rate	31%	30%	33%	33%	32%	32%	32%
BIO	Proposals	5,255	5,676	5,209	4,857	4,711	25,708	5,142
	Awards	1,383	1,328	1,416	1,404	1,370	6,901	1,380
	Funding Rate	26%	23%	27%	29%	29%	27%	27%
CSE	Proposals	2,067	1,931	2,010	2,035	2,255	10,298	2,060
	Awards	722	647	731	706	759	3,565	713
	Funding Rate	35%	34%	36%	35%	34%	35%	35%
EHR	Proposals	4,979	3,732	3,369	3,508	2,827	18,415	3,683
	Awards	1,475	1,326	1,191	1,212	809	6,013	1,203
	Funding Rate	30%	36%	35%	35%	29%	33%	33%
ENG	Proposals	5,740	5,956	6,076	5,589	5,475	28,836	5,767
	Awards	1,473	1,383	1,573	1,390	1,483	7,302	1,460
	Funding Rate	26%	23%	26%	25%	27%	25%	25%
GEO	Proposals	3,421	3,723	3,950	3,317	3,435	17,846	3,569
	Awards	1,199	1,161	1,337	1,227	1,312	6,236	1,247
	Funding Rate	35%	31%	34%	37%	38%	35%	35%
MPS	Proposals	5,203	4,958	5,536	5,265	5,177	26,139	5,228
	Awards	1,864	1,817	1,993	1,835	1,891	9,400	1,880
	Funding Rate	36%	37%	36%	35%	37%	36%	36%
SBE	Proposals	3,490	3,453	3,286	3,091	3,909	17,229	3,446
	Awards	1,149	1,137	1,223	1,262	1,190	5,961	1,192
	Funding Rate	33%	33%	37%	41%	30%	35%	35%
Other	Proposals	545	802	753	656	715	3,471	694
	Awards	298	272	400	243	298	1,511	302
	Funding Rate	55%	34%	53%	37%	42%	44%	44%

Source: NSF Enterprise Information System, as of December 15, 1999.

Appendix Table 2

Competitively Reviewed Proposals, Awards and Funding Rates By PI Characteristics, FY 1992 - 1999

		Fiscal Year							
		1992	1993	1994	1995	1996	1997	1998	1999
All PIs	Proposals	30,320	30,003	30,399	30,700	30,231	30,189	28,318	28,504
	Awards	10,356	9,148	9,976	9,563	9,071	9,864	9,279	9,112
	Funding Rate	34%	30%	33%	31%	30%	33%	33%	32%
Female PIs	Proposals	4,448	4,468	4,833	4,945	5,170	5,382	5,603	5,292
	Awards	1,519	1,460	1,641	1,582	1,666	1,938	1,920	1,658
	Funding Rate	34%	33%	34%	32%	32%	36%	34%	31%
Male PIs	Proposals	25,334	25,137	25,023	25,151	24,712	24,448	22,379	22,935
	Awards	8,503	7,563	8,018	7,633	7,292	7,793	7,219	7,365
	Funding Rate	34%	30%	32%	30%	30%	32%	32%	32%
Minority PIs	Proposals	1,481	1,408	1,449	1,521	1,527	1,452	1,377	1,418
	Awards	469	391	422	422	472	459	408	430
	Funding Rate	32%	28%	29%	28%	31%	32%	30%	30%
New PIs	Proposals	14,988	14,284	14,566	14,192	13,630	13,267	12,204	11,831
	Awards	3,735	3,025	3,598	3,367	3,021	3,264	3,041	2,675
	Funding Rate	25%	21%	25%	24%	22%	25%	25%	23%
Prior PIs	Proposals	15,332	15,719	15,833	16,508	16,601	16,922	16,114	16,673
	Awards	6,621	6,123	6,378	6,196	6,050	6,600	6,238	6,437
	Funding Rate	43%	39%	40%	38%	36%	39%	39%	39%

Notes:

“Competitively reviewed” proposals and awards are actions for research, education and training processed through NSF’s merit review system each year.

“Gender” is based on self-reported information from the PI’s most recent proposal.

“Minority” is based on the PI’s ethnic/racial status as reported to NSF on the most recent proposal. PIs can decline to report their ethnic/racial status. Includes American Indian, Alaskan Native, Black, Hispanic, and Pacific Islander and excludes Asian and White-Not of Hispanic Origin.

Source: NSF Enterprise Information System, as of December 15, 1999

Appendix Table 3

**Median and Average Award Amounts by Directorate
Research Grants
FY 1995 – 1999**

		Fiscal Year				
		1995	1996	1997	1998	1999
NSF	Median	\$59,468	\$61,744	\$67,000	\$70,854	\$73,335
	Average	\$72,798	\$75,613	\$82,256	\$89,854	\$92,788
BIO	Median	\$76,667	\$79,604	\$85,819	\$90,000	\$94,078
	Average	\$82,960	\$84,415	\$89,670	\$103,327	\$125,901
CSE	Median	\$55,395	\$57,788	\$74,450	\$75,000	\$82,850
	Average	\$76,283	\$86,721	\$93,634	\$99,014	\$108,661
ENG	Median	\$62,087	\$68,870	\$70,000	473,122	\$73,547
	Average	\$69,433	\$73,168	\$77,864	\$86,879	\$84,594
GEO	Median	\$61,821	\$62,635	\$66,516	\$69,465	\$66,796
	Average	\$75,859	\$80,467	\$80,182	\$86,747	\$85,609
MPS	Median	\$55,833	\$60,000	\$65,000	\$73,670	\$77,139
	Average	\$80,487	\$82,060	\$91,409	\$94,559	\$93,591
SBE	Median	\$33,973	\$27,471	\$32,278	\$37,387	\$39,493
	Average	\$42,068	\$37,404	\$46,673	\$51,807	\$49,481
O/D	Median	\$61,466	\$76,358	\$75,634	\$85,575	\$81,096
	Average	\$80,826	\$95,434	\$103,259	\$111,461	\$112,671

Note: Median and average are based on competitively reviewed research awards.

Source: NSF Enterprise Information System, as of February 7, 2000.

Appendix Table 4

**Methods of NSF Proposal Review
FY 1990-1999**

FY	Total Proposals	Mail + Panel		Mail-Only		Panel-Only	
		Proposals	Percent	Proposals	Percent	Proposals	Percent
1999	29,564	10,324	35%	5,292	18%	13,948	47%
1998	28,492	9,883	35%	5,890	21%	12,719	45%
1997	29,467	10,334	35%	6,718	23%	12,415	42%
1996	29,595	9,853	33%	6,853	23%	12,889	44%
1995	30,096	9,844	33%	7,540	25%	12,712	42%
1994	29,869	8,499	28%	7,582	25%	13,788	46%
1993	28,956	8,401	29%	7,949	27%	12,606	44%
1992	28,938	8,484	29%	8,970	31%	11,484	40%
1991	27,945	8,602	31%	8,307	30%	11,036	39%
1990	27,987	8,834	32%	9,099	33%	10,054	36%

Note: "O/D" includes the Office of Polar Programs and the Office of Integrative Activities.
 Panel-Only includes cases where panelist was mailed proposal for review prior to panel.
 FY 1999 numbers includes 1,570 reviewed preproposals.

Source: NSF Enterprise Information System, as of December 15, 1999.

**Appendix Table 5
Methods of NSF Proposal Review
By Directorate, FY 1999**

Directorate	Total	Mail + Panel		Mail-Only		Panel-Only	
	Proposals	Proposals	Percent	Proposals	Percent	Proposals	Percent
NSF	29,564	10,324	35%	5,292	18%	13,948	47%
BIO	4,622	3,398	74%	99	2%	1,125	24%
CSE	2,287	412	18%	158	7%	1,717	75%
EHR	3,364	111	3%	103	3%	3,150	94%
ENG	5,626	456	8%	813	14%	4,357	77%
GEO	3,401	2,457	72%	649	19%	295	9%
MPS	5,136	1,230	24%	2,521	49%	1,385	27%
SBE	3,880	1,853	48%	730	19%	1,297	33%
Other	1,248	407	33%	219	18%	622	50%

Note: "Other" includes the Office of Polar Programs and the Office of Integrative Activities.
Panel-Only includes cases where panelist was mailed proposal for review prior to panel. FY 1999 numbers includes 1,570 reviewed preproposals.

Source: NSF Enterprise Information System, as of December 15, 1999

Appendix Table 6

**Average Number of Reviews per Proposal
By Method and Directorate, FY 1999**

Directorate		Methods Of Review			
		All Methods	Mail + Panel	Mail-Only	Panel-Only
BIO	Reviews	72,736	57,157	474	15,105
	Proposals	4,622	3,398	99	1,125
	Rev/Prop	15.7	16.8	4.8	13.4
CSE	Reviews	11,727	2,635	645	8,447
	Proposals	2,287	412	158	1,717
	Rev/Prop	5.1	6.4	4.1	4.9
EHR	Reviews	19,664	777	428	18,459
	Proposals	3,364	111	103	3,150
	Rev/Prop	5.8	7.0	4.2	5.9
ENG	Reviews	22,521	2,506	3,439	16,576
	Proposals	5,626	456	813	4,357
	Rev/Prop	4.0	5.5	4.2	3.8
GEO	Reviews	36,709	31,042	3,410	2,257
	Proposals	3,401	2,457	649	295
	Rev/Prop	10.8	12.6	5.3	7.7
MPS	Reviews	37,306	12,266	12,052	12,988
	Proposals	5,136	1,230	2,521	1,385
	Rev/Prop	7.3	10.0	4.8	9.4
SBE	Reviews	37,883	21,865	2,722	13,296
	Proposals	3,880	1,853	730	1,297
	Rev/Prop	9.8	11.8	3.7	10.3
O/D	Reviews	7,599	3,821	992	2,786
	Proposals	1,248	407	219	622
	Rev/Prop	6.1	9.4	4.5	4.5

Notes:

Peers participating as both a mail and panel reviewer for the same proposal are counted as one review in this table.

Source: NSF Enterprise Information System, as of December 15, 1999.

FY 1999 numbers includes 1,570 reviewed preproposals, 1,554 were reviewed by panel and 16 by mail.

Appendix Table 7

Requests for Formal Reconsideration of Declined Proposals By Directorate, FY 1994 - 1999

		Fiscal Year					
		1994	1995	1996	1997	1998	1999
First Level Reviews (by Assistant Directors):							
NSF	Request	28	38	46	39	53	36
	- Upheld	30	37	45	34	48	34
	- Reversed	0	1	1	4	3	0
BIO	Request	5	4	3	4	6	4
	- Upheld	5	4	3	2	6	4
	- Reversed	0	0	0	2	0	0
CISE	Request	0	3	1	2	3	1
	- Upheld	0	3	1	2	3	1
	- Reversed	0	0	0	0	0	0
EHR	Request	4	3	8	4	6	3
	- Upheld	6	3	8	4	5	3
	- Reversed	0	0	0	0	1	0
ENG	Request	6	3	5	9	5	4
	- Upheld	6	3	5	9	4	4
	- Reversed	0	0	0	0	0	0
GEO	Request	5	5	4	2	2	2
	- Upheld	5	5	4	2	2	1
	- Reversed	0	0	0	0	0	0
MPS	Request	8	18	20	17	25	20
	- Upheld	8	17	19	15	22	19
	- Reversed	0	1	1	2	2	0
SBE	Request	0	2	1	2	3	0
	- Upheld	0	2	1	1	3	1
	- Reversed	0	0	0	0	0	0
Other	Request	0	0	4	0	0	0
	- Upheld	0	0	4	0	0	0
	- Reversed	0	0	0	0	0	0
Second Level Reviews (by Deputy Director):							
O/DD	Request	8	11	7	4	3	2
	- Upheld	9	10	7	4	3	1
	- Reversed	0	0	0	0	0	0

Notes: The number of decisions (upheld or reversed) may not equal the number of requests in each year due to carryover of pending reconsideration request.

Source: Office of the Director

Appendix Table 8

**Small Grants for Exploratory Research (SGER)
Proposals, Awards and Funding Rates
By Directorate, FY 1992 – 1999**

		Fiscal Year								<i>Eight-year Total</i>	<i>Eight-year Average</i>
		1992	1993	1994	1995	1996	1997	1998	1999		
NSF	Proposals	300	309	258	228	205	244	302	277	2,123	265
	Awards	194	213	185	168	144	194	250	223	1,571	196
	Funding Rate	65%	69%	72%	74%	70%	80%	83%	81%	74%	74%
BIO	Proposals	81	80	63	56	50	44	59	48	481	60
	Awards	39	57	39	40	28	29	48	36	316	40
	Funding Rate	48%	71%	62%	71%	56%	66%	81%	75%	66%	66%
CSE	Proposals	14	15	11	18	22	23	21	24	148	19
	Awards	9	11	9	18	19	23	20	22	131	16
	Funding Rate	64%	73%	82%	100%	86%	100%	95%	92%	89%	89%
EHR	Proposals	1	9	5	5	1	7	9	15	52	7
	Awards	1	9	5	5	1	6	8	14	49	6
	Funding Rate	100%	100%	100%	100%	100%	86%	89%	93%	94%	94%
ENG	Proposals	91	94	83	65	59	68	95	89	644	81
	Awards	69	67	61	52	45	57	72	75	498	62
	Funding Rate	76%	71%	73%	80%	76%	84%	76%	84%	77%	77%
GEO	Proposals	44	41	36	28	27	40	56	44	316	40
	Awards	37	37	33	22	23	38	54	40	284	36
	Funding Rate	84%	90%	92%	79%	85%	95%	96%	91%	90%	90%
MPS	Proposals	46	44	42	35	27	32	17	33	276	35
	Awards	21	17	25	16	12	13	10	16	130	16
	Funding Rate	46%	39%	60%	46%	44%	41%	59%	48%	47%	47%
SBE	Proposals	21	28	12	15	14	19	30	16	155	19
	Awards	16	17	8	9	11	18	25	12	116	15
	Funding Rate	76%	61%	67%	60%	79%	95%	83%	75%	75%	75%
OPP	Proposals	2	7	11	11	6	11	15	8	71	9
	Awards	2	7	10	11	6	10	13	8	67	8
	Funding Rate	100%	100%	91%	100%	100%	91%	87%	100%	94%	94%

Source: NSF Enterprise Information System, as of January 14, 2000.

Appendix Table 9

Small Grants for Exploratory Research (SGER) Funding Trends by Directorate, FY 1997 – 1999

		Fiscal Year			<i>Three-year Total</i>
		1997	1998	1999	
NSF	Total \$	\$8,413,152	\$12,320,200	\$12,293,477	\$33,026,829
	Awards	194	250	223	667
	Average \$	\$ 43,367	\$ 49,281	\$ 55,128	\$ 49,515
BIO	Total \$	\$1,335,223	\$2,496,514	\$1,984,457	\$ 5,816,194
	Awards	29	48	36	113
	Average \$	\$ 46,042	\$ 52,011	\$ 55,124	\$ 51,471
CSE	Total \$	\$1,173,626	\$1,330,556	\$1,739,513	\$ 4,243,695
	Awards	23	20	22	65
	Average \$	\$ 51,027	\$ 66,528	\$ 79,069	\$ 65,288
EHR	Total \$	\$263,762	\$597,469	\$971,346	\$ 1,832,577
	Awards	6	8	14	28
	Average \$	\$ 43,960	\$ 74,684	\$ 69,382	\$ 65,449
ENG	Total \$	\$2,867,796	\$4,080,144	\$4,371,965	\$11,319,905
	Awards	57	72	75	204
	Average \$	\$ 50,312	\$ 56,669	\$ 58,293	\$ 55,490
GEO	Total \$	\$1,183,592	\$2,143,438	\$1,464,750	\$ 4,791,780
	Awards	38	54	40	132
	Average \$	\$ 31,147	\$ 39,693	\$ 36,619	\$ 36,301
MPS	Total \$	\$650,350	\$497,735	\$908,436	\$ 2,056,521
	Awards	13	10	16	39
	Average \$	\$ 50,027	\$ 49,774	\$ 56,777	\$ 52,731
SBE	Total \$	\$625,708	\$661,043	\$534,126	\$ 1,820,877
	Awards	18	25	12	55
	Average \$	\$ 34,762	\$ 26,442	\$ 44,511	\$ 33,107
O/D	Total \$	\$313,095	\$513,301	\$318,884	\$ 1,145,280
	Awards	10	13	8	31
	Average \$	\$ 31,310	\$ 39,485	\$ 39,861	\$ 36,945

Source: NSF Enterprise Information System, as of January 14, 2000.