

SCIENTIFIC COMPUTING RESEARCH ENVIRONMENTS FOR THE MATHEMATICAL SCIENCES (SCREMS)

Program Solicitation

DIRECTORATE FOR MATHEMATICAL AND PHYSICAL SCIENCES
DIVISION OF MATHEMATICAL SCIENCES

PROPOSAL DEADLINE: *January 18*

ALL PROPOSALS MUST BE SUBMITTED VIA FASTLANE



NATIONAL SCIENCE FOUNDATION

NSF 99-154 (supersedes NSF 99-48)



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- **Location:** 4201 Wilson Blvd.
Arlington, VA
22230
- **For General Information (NSF Information Center):** (703) 306-1234
- **TDD (for the hearing-impaired):** (703) 306-0090
- **To Order Publications or Forms:**
 - Send an e-mail to: pubs@nsf.gov
 - or telephone: (301) 947-2722
- **To Locate NSF Employees:** (703) 306-1234

Summary of Program Requirements

General Information

- **Program Name:** Scientific Computing Research Environments for the Mathematical Sciences (SCREMS)
- **Short Description/Synopsis of Program:** The Division of Mathematical Sciences (DMS) of the National Science Foundation plans a limited number of grants for the support of computing environments for research in the mathematical sciences. SCREMS proposals are for computing environments dedicated to research in the mathematical sciences. Proposals may request support for purchase of computing equipment, and limited support for professional systems administrators or programmer personnel for research computing needs. These grants are intended for researchers of high quality and productivity whose research requires access to suitable equipment. Awards are made to provide support for specific research projects rather than to provide general computing capacity. Proposers are encouraged to include projects involving symbolic and algebraic computations and graphical representations (visualization) in aid of the research as well as those emphasizing traditional numerical computations and simulations.
- **Cognizant Program Officer(s):** Dr. Alvin Thaler, Program Officer, Room 1025, Division of Mathematical Sciences, telephone (703) 306-1880, e-mail: SCREMS@nsf.gov.
- **Applicable Catalog of Federal Domestic Assistance (CFDA) No.:** 47.049 — Mathematical and Physical Sciences

Eligibility

- **Limitation on the categories of organizations that are eligible to submit proposals:** Proposals may be submitted by U.S. educational institutions with ongoing research programs in mathematics, applied mathematics, or statistics. Proposals involving inter-institutional or inter-departmental sharing arrangements are welcome.
- **PI eligibility limitations:** None
- **Limitation on the number of proposals that may be submitted by an organization:** None

Award Information

- **Type of award anticipated:** Standard Grant
- **Number of awards anticipated in FY 2000:** Approximately 20 awards
- **Amount of funds available:** Approximately \$1 million will be available for this activity in FY 2000
- **Anticipated date of award:** July 2000

Proposal Preparation & Submission Instructions

- **Proposal Preparation Instructions**
 - **Letter of Intent requirements:** None
 - **Preproposal requirements:** None
 - **Proposal preparation instructions:** National Science Foundation Grant Proposal Guide instructions, with exceptions as noted below.
 - **Supplemental proposal preparation instructions:** None
 - **Deviations from standard (GPG) proposal preparation instructions:** Specific page limitations are provided in the body of the solicitation.
- **Budgetary Information**
 - **Cost sharing/matching requirements:** 50% of the net (after discount) cost of equipment; 50% of personnel salary and fringe benefits, if requested. See details in the body of the solicitation. The indirect cost rate applied to personnel costs (salary and fringe benefits) will be limited to 10%.
 - **Indirect cost (F&A) limitations:** No indirect costs will be permitted on equipment portions of grants. The indirect cost rate applied to personnel costs (salary and fringe benefits) will be limited to 10%.
 - **Other budgetary limitations:** None
- **FastLane Requirements**
 - **FastLane proposal preparation requirements:** FastLane use required
 - **FastLane point of contact:** Florence Rabanal, (703) 306-1998, email: dmsfl@nsf.gov
- **Deadline/Target Dates**
 - **Proposal Deadline:** 5:00 PM, proposer's local time, January 18

Proposal Review Information

- **Merit Review Criteria:** National Science Board approved criteria; additional criteria specific to this solicitation are provided in the body of the solicitation.

Award Administration Information

- **Grant Award Conditions:** GC-1 or FDP III
- **Special grant conditions anticipated:** None anticipated

- **Special reporting requirements anticipated:** None

INTRODUCTION

The Division of Mathematical Sciences of the National Science Foundation plans a limited number of grants for the support of computing environments for research in the mathematical sciences. This solicitation provides guidance for the preparation of eligible proposals.

Who may submit: Proposals may be submitted by U.S. educational institutions with ongoing research programs in mathematics, applied mathematics, or statistics. Proposals involving inter-institutional or inter-departmental sharing arrangements are welcome.

Purpose: SCREMS proposals are for computing environments dedicated to research in the mathematical sciences. Proposals may request support for purchase of computing equipment, and limited support for professional systems administrators or programmer personnel for research computing needs. These grants are intended for researchers of high quality and productivity whose research requires access to suitable equipment. Awards are made to provide support for specific research projects rather than to provide general computing capacity. Proposers are encouraged to include projects involving symbolic and algebraic computations and graphical representations (visualization) in aid of the research as well as those emphasizing traditional numerical computations and simulations.

Proposers and institutions may find appropriate other NSF sources of support for instrumentation, including the Major Research Instrumentation (MRI) program, most recent Program Announcement 99-34 (for updated information see <http://www.nsf.gov/od/oia/programs/mri/start.htm>).

Principal Investigator: Faculty member(s) who are administratively responsible for the acquisition planning, use, and maintenance of the equipment. For convenience the Department Head may be designated, but this is not required.

Character of requests: This Program is intended to provide for needs that cannot be met by other research programs of NSF's Division of Mathematical Sciences. Requests are expected to be for support that is required jointly by several (two to five) research projects or difficult to justify for one project alone. Amalgamation of small requests that could be made to disciplinary research programs is discouraged.

SCREMS proposals may request funding for equipment only, certain personnel costs only (see Section VI below), or both equipment and personnel costs.

When appropriate and cost-effective, requests for group or departmental servers may be suitable for the SCREMS program.

It is especially important that the proposers make a strong case for the proposed computing environment as a coherent "computer system" and be able to describe thoroughly and in detail the impact of the proposed equipment on the proposed research activities. If this is intended to be the main computer system for a collection of research projects, describe the minimum computing

requirements and explain, if necessary, why a more-than-minimum system might be proposed. If the proposed equipment includes a "server" and "workstations," are the workstations of power equal to or greater than the server? This would require additional, separate justification.

Budget Request Size: If equipment is requested, the total discounted cost of the equipment portion should be at least \$40,000. There is no minimum if support is requested only for professional systems administrators or programmer personnel for research computing needs. See Section VI below.

Some awards may be as high as \$200,000, provided a case is made for substantial impact and cost-effectiveness. The Division of Mathematical Sciences expects to provide about \$1,000,000 for this activity in Fiscal Year 2000, pending availability of funds. In Fiscal Year 1999, 14 awards were made, totaling about \$800,000.

PROPOSAL PREPARATION AND SUBMISSION INSTRUCTIONS

GPG Guidelines

Full proposals submitted in response to this program solicitation should be prepared and submitted in accordance with the general guidelines contained in the *Grant Proposal Guide* (GPG), NSF 00-2, except as described below. The complete text of the GPG is available electronically on the NSF Web site at: <http://www.nsf.gov/>. Paper copies of the GPG may be obtained from the NSF Publications Clearinghouse, telephone 301-947-2722 or by e-mail from pubs@nsf.gov.

Please note carefully the page limits for the various parts of the proposal, as well as the margin and font size limits.

FastLane Submission Required

SCREMS proposals *must* be submitted through the NSF FastLane system for electronic proposal preparation and submission. (See FastLane Requirements below.)

FastLane Requirements: SCREMS proposals must be submitted electronically using the NSF FastLane system for electronic proposal preparation and submission. The FastLane system is available through the Web at the FastLane Web site at <http://www.fastlane.nsf.gov>. The Sponsored Research Office (SRO or equivalent) must provide a FastLane Personal Identification Number (PIN) to each Principal Investigator (PI) to gain access to the FastLane "Proposal Preparation" application. PIs that have not submitted a proposal to NSF in the past must contact their SRO to be added to the NSF PI database. This should be done as soon as the decision to prepare a proposal is made.

In order to use NSF FastLane to prepare and submit a proposal, the following are required:

Browser (must support multiple buttons and file upload)

Netscape 3.01 or greater

Microsoft Internet Explorer 4.01 or greater

PDF Reader (needed to view/print forms)

Adobe Reader 3.0 or greater

PDF Generator (needed to create project description)

Adobe Acrobat 3.01 or greater

Aladdin Ghostscript 5.10 or greater

A list of registered institutions and the FastLane registration form are located on the FastLane Web page.

Proposers are strongly advised to ensure that the required registrations have been completed, and the necessary software is available, well before the proposal submission deadline. The FastLane instructions specify how to obtain help if needed.

Identifying Program Solicitation Number on Cover Sheet

Proposers are reminded to identify the program solicitation number (NSF99-154) in the program solicitation/solicitation block on the NSF Form 1207, "*Cover Sheet for Proposal to the National Science Foundation.*" The cover sheet should also identify the DIVISION OF MATHEMATICAL SCIENCES as the organizational unit to receive the proposal. This can be done by clicking the "Add Organizational Unit" button, which can be found on the Cover Sheet Screen within the FastLane Proposal Preparation Module, and selecting the item from the pull-down menu. Compliance with this requirement is critical to determining the relevant proposal processing guidelines. Failure to submit this information may delay processing.

Proposals **MUST** be submitted by 5:00 PM, local time, January 18. Copies of the signed proposal cover sheet must be submitted in accordance with the instructions identified below.

Submission of Signed Cover Sheets. The signed proposal Cover Sheet (NSF Form 1207) should be forwarded to the following address and received by NSF within five working days following proposal submission:

**National Science Foundation
DIS-FastLane Cover Sheet
4201 Wilson Blvd.
Arlington, VA 22230**

A proposal may not be processed until the complete proposal (including signed Cover Sheet) has been received by NSF.

Proposal Format

Proposals should contain each of the seven parts detailed below, in the order given. Proposals should not exceed 15 pages in total length (10 or 12 point font) including any appendices, but excluding the Cover Sheet (NSF Form 1207), Table of Contents, the NSF budget form 1030, Biographical Sketches, and statement(s) of other support. **Proposals not adhering to the page limitations or to the requirements of NSF 00-2, or not received by the deadline, will be returned.** The Biographical Sketches (*vitae*) section has its own page limit; the entire *vitae* section must not exceed three pages (see Section V below).

I. Completed Cover Sheet

1. Program Solicitation: For consideration by Division of Mathematical Sciences; Solicitation number NSF 99-154
2. Title: Scientific Computing Research Environments for the Mathematical Sciences (SCREMS)

II. Project Summary - Proposal Section A

The proposal must contain a summary (200 words overall) briefly describing the equipment requested and the research projects for which it is to be used. Suggested format:

The Department(s) of _____ at the University (Universities) of _____ will purchase _____ equipment which will be dedicated to the support of research in the mathematical sciences. The equipment will be used for several research projects, including in particular: (etc.).

III. Table of contents - Proposal Section B. NSF Standard FastLane Form 1359 (10/99). This section will be generated automatically by FastLane.

IV. Project Description - Proposal Section C

This section must consist of the following:

- a) *Brief description (not to exceed two pages) of minimum user requirements.* Requirements for such items as operating systems, networking capability, compatibility with existing hardware, software requirements, speed, internal and external memory, resolution and color or monochrome capability, etc., should be included.
- b) *Abstracts of individual research projects.* For each of the proposed research projects (usually at least two, and strictly limited to five) give the project title, name(s) of participating researchers, and a short summary of the research project (100 words).
- c) *Detailed explanation of each proposed research project and its relationship to the requested equipment.* This portion of the proposal must not exceed 3 pages per project. For each project listed under Section IVb, above, give appropriate scientific justification and literature references, and explain how the research is dependent upon the requested equipment.

The scientific merit of the research made possible by the requested equipment, and the impact of the proposed equipment on the research activity, are the most important selection criteria.

Proposals will be judged by a panel of mathematical scientists chosen to provide a wide range of expertise across the mathematical sciences, but some subareas may not be represented by specialists. Thus, all proposals must contain descriptions of the research projects in sufficient detail so that the scientific merit of each project can be evaluated by qualified reviewers who may or may not be specialists in the proposed research areas. Particular emphasis should be given to those unique or new scientific capabilities which will ensue from the proposed acquisition.

d) *Detailed plan for maintenance and operation* . Include names of individuals responsible for the equipment, and the annual budget that the institution will allocate for these purposes. This plan should be for a three year period. If personnel support is requested, please include relevant details, including qualifications and duties of individuals involved, and an explicit statement of the institution's agreement to assume personnel costs permanently, after a period not to exceed two years.

e) *Available equipment*. **This section should include a complete description of equipment and related supporting personnel currently available to the Department(s)**. List the research computing facilities that are presently available to the participating researchers, and if appropriate describe the support staff dedicated to maintenance and operation of the equipment and system. Make explicit reference to the current location, condition, and use of any equipment purchased by your institution under prior SCREMS grants. List current pending equipment requests to NSF and to other funding sources.

SCREMS proposals need not have a separate Proposal Section D - References Cited - as called for in the GPG. References may be cited within Proposal Section C.

V. Biographical Sketches - Proposal Section E

This section will consist of biographical data and will include only the academic essentials for the participating researchers listed under Section IVb above. This may include, for the participating researchers, a list of up to five publications most closely related to the proposed equipment acquisition, and up to five other significant recent publications. This material should appear in the *Biographical Sketches* section and will not be counted in the page limitation requirement. **The entire Biographical Sketches section is limited to no more than 3 pages.**

VI. Budget, Institutional Commitments and Cost Sharing - Proposal Section F

Show total costs and all sources of support. The budget should make reference to a representative manufacturer and model numbers, with itemized and total costs. If the request includes funding for equipment, the total discounted cost of equipment should be at least \$40,000. If support is requested only for professional systems administrators or programmer personnel for research computing needs, there is no minimum.

The proposal should describe the institution's provisions for space, installation, maintenance and operation of the requested equipment. NSF will not provide funds for these items.

Institutions submitting proposals must cost-share 50% of the cost of the proposed equipment — fifty per cent of the net (after discount) cost. Eligible cost-sharing is allowed only on the cost of equipment and not the costs associated with existing or irrelevant equipment, site preparation, maintenance, or installation costs.

SCREMS proposals may include requests for partial support (salary and fringe benefits), for up to two years, for professional systems administrators or programmer personnel for research computing needs. (Graduate students performing these functions will not be supported under this program). In each request for such, provision must be made by the University for cost-sharing half of the personnel costs. Proposals must also include a statement that the grantee will assume the full personnel costs after NSF funding ends.

No indirect costs will be permitted on equipment portions of grants. The indirect cost rate applied to personnel will be limited to 10%, with the difference between the actual indirect cost rate and 10% allocated to the substantial cost-sharing (beyond the 50% personnel match referenced in the previous paragraph) required on SCREMS awards.

VII. Current and pending project support - Proposal Section G

This includes all anticipated requests for such, from whatever source (e.g., Federal, State or local government agencies, private foundations, industrial or other commercial organizations). See II.D.8 of the GPG (NSF 00-2).

PROPOSAL REVIEW INFORMATION

Section IV describing research projects and the dependence of the research on the support requested is the most important part of the proposal. A proposal for a coherent computer system that meets the needs of the research is more competitive than a proposal about which questions arise as to the appropriateness of the particular hardware proposed for the particular research proposed.

Proposals submitted in response to this program solicitation will be reviewed against the following general review criteria approved by the National Science Board. Following each criterion are potential considerations that the reviewer may employ in the evaluation. These are suggestions; not all will apply to any given proposal. Each reviewer will be asked to address only those questions that he/she considers relevant to the proposal and for which he/she is qualified to make judgments.

What is the intellectual merit and quality of the proposed activity?

How important is the proposed activity to advancing knowledge and understanding within its own field and 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 prior work.) To what extent does the proposed activity suggest and explore creative and original 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, 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?

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 learner perspectives. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

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. PIs should address this issue in their proposal to provide reviewers with the information necessary to respond fully to both NSF merit review criteria. NSF staff will give it careful consideration in making funding decisions.

Additional review criteria

In addition to the above generic review criteria, reviewers will be asked to use the following criteria when reviewing proposals that respond to this solicitation.

- Scientific merit of the research made possible by the requested equipment,
- Impact of the proposed equipment on the research activity,
- Qualifications and productivity of researchers,
- Justification of need for proposed equipment,
- Choice and appropriateness of equipment,
- Appropriateness of personnel support,
- Plan for maintenance and operation, and
- Impact of the proposed equipment and environment on the department and institution.

AWARD ADMINISTRATION INFORMATION

A. Notification of the Award

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 Division administering the program. Verbatim copies of reviews, not including the identity of the reviewer, will be provided automatically to the Principal Investigator.

B. Grant Award Conditions.

An NSF grant consists of: (1) the award letter, which includes any special provisions applicable to the grant 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 grant conditions, such as Grant General Conditions (NSF GC-1)*

or Federal Demonstration Partnership Phase III (FDP) Terms and Conditions* and (5) any NSF brochure, program guide, announcement or other NSF issuance that may be incorporated by reference in the award letter. Electronic mail notification is the preferred way to transmit NSF grants to organizations that have electronic mail capabilities and have requested such notification from the Division of Grants and Agreements.

* These documents may be accessed electronically on NSF's Web site at: <http://www.nsf.gov/>. Paper copies may be obtained from the NSF Publications Clearinghouse, telephone 301-947-2722 or by e-mail from pubs@nsf.gov.

C. Reporting Requirements.

For all multi-year grants (including both standard and continuing grants), the PI must submit an annual project report via FastLane to the cognizant Program Officer at least 90 days before the end of the current budget period.

Within 90 days after expiration of a grant, the PI also is required to submit a final project report via FastLane. Approximately 30 days before expiration, NSF will send a notice to remind the PI of the requirement to file the final project report. Failure to provide final technical reports delays NSF review and processing of pending proposals for that PI. PIs should examine the formats of the required reports in advance to assure availability of required data.

CONTACTS FOR ADDITIONAL INFORMATION

Questions concerning the SCREMS program should be sent electronically to SCREMS@nsf.gov. For questions related to use of FastLane, contact Florence Rabanal, MPS FastLane Coordinator, 703-306-1998, e-mail: dmsfl@nsf.gov.

OTHER PROGRAMS OF INTEREST

The NSF Guide to Programs is a compilation of funding opportunities for research and education in science, mathematics, and engineering. General descriptions of NSF programs, research areas, and eligibility information for proposal submission are provided in each chapter. Beginning in fiscal year 1999, the NSF Guide to Programs only will be available electronically. Many NSF programs offer announcements concerning specific proposal requirements. To obtain additional information about these requirements, contact the appropriate NSF program offices listed in Appendix A of the GPG.

Any changes in NSF's fiscal year programs occurring after press time for the Guide to Programs will be announced in the NSF E-Bulletin, available electronically on the NSF Web site at: <http://www.nsf.gov/>. The direct URL for the E-Bulletin is <http://www.nsf.gov/home/ebulletin>. Subscribers can also sign up for NSF's Custom News Service to find out what funding opportunities are available.

ABOUT THE NATIONAL SCIENCE FOUNDATION

The National Science Foundation (NSF) funds research and education in most fields of science and engineering. Grantees are wholly responsible for conducting their project activities and preparing the results for publication. Thus, the Foundation does not assume responsibility for such findings or their interpretation.

NSF welcomes proposals from all qualified scientists, engineers and educators. The Foundation strongly encourages women, minorities, and persons with disabilities to compete fully in its programs. In accordance with federal statutes, regulations, and NSF policies, no person on grounds of race, color, age, sex, national origin, or disability shall be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any program or activity receiving financial assistance from NSF (unless otherwise specified in the eligibility requirements for a particular program).

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

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 regarding NSF programs, employment, or general information. TDD may be accessed at (703) 306-0090 or through FIRS on 1-800-877-8339.

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; 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 review process; to applicant 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 needing information as part of the review process or in order to coordinate programs; 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," 63 Federal Register 267 (January 5, 1998), and NSF-51, "Reviewer/Proposal File and Associated Records," 63 Federal Register 268 (January 5, 1998). Submission of the information is voluntary. Failure to provide full and complete information, however, may reduce the possibility of receiving an award.

Public reporting burden for this collection of information is estimated to average 120 hours per response, including the time for reviewing instructions. Send comments regarding this burden

estimate 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.

YEAR 2000 REMINDER

In accordance with Important Notice No. 120 dated June 27, 1997, Subject: Year 2000 Computer Problem, NSF awardees are reminded of their responsibility to take appropriate actions to ensure that the NSF activity being supported is not adversely affected by the Year 2000 problem. Potentially affected items include: computer systems, databases, and equipment. The National Science Foundation should be notified if an awardee concludes that the Year 2000 will have a significant impact on its ability to carry out an NSF funded activity. Information concerning Year 2000 activities can be found on the NSF web site at <http://www.nsf.gov/oirm/y2k/start.htm>.

The National Science Foundation is committed to making all of the information we publish easy to understand. If you have a suggestion about how to improve the clarity of this document or other NSF-published materials, please contact us at plainlanguage@nsf.gov.

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OMB# 3145-0058

NSF 99-154 (Replaces NSF 99-48)•