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94TH CONGRESS } HOUSE OF REPRESENTATIVES } REPORT
2d Session } } No. 94-946

CONSIDERATION OF H.R. 12566

MARCH 24, 1976.—Ordered to be printed

Mr. YOUNG of Texas, from the Committee on Rules,
submitted the following

REPORT

[To accompany H. Res. 1104]

The Committee on Rules, having had under consideration House Resolution 1104, by a nonrecord vote report the same to the House with the recommendation that the resolution do pass.



Calendar No. 846

94TH CONGRESS }
2d Session

SENATE

{ REPORT
No. 94-890

NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT, 1977

MAY 14, 1976.—Ordered to be printed
Filed under authority of the order of the Senate May 13, 1976

Mr. KENNEDY, from the Committee on Labor and Public Welfare,
submitted the following

REPORT

[To accompany H.R. 12566]

The Committee on Labor and Public Welfare, to which was referred the bill (H.R. 12566) authorizing appropriations to the National Science Foundation for fiscal year 1977, having considered the same, reports thereon without recommendation.



NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT, 1977

MAY 14, 1976.—Ordered to be printed under authority of the order
of the Senate of May 13, 1976

MR. KENNEDY, from the Committee on Labor and Public Welfare,
submitted the following

REPORT

[To accompany S. 3202]

The Committee on Labor and Public Welfare, to which was referred the bill (S. 3202) to authorize appropriations for activities of the National Science Foundation for fiscal year 1977, and for other purposes, having considered the same, reports favorably thereon with an amendment and recommends that the bill as amended do pass.

I. Introduction

A. CHRONOLOGY OF THE NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT, 1977

The following bills authorizing appropriations for the National Science Foundation were considered by the Committee: S. 3202, introduced by Senator Kennedy on March 24, 1976 for himself and Senators Pell and Mondale; S. 3068, introduced by Senator Javits on March 2, 1976; and H.R. 12566, passed by the House of Representatives and referred to the Committee on March 29, 1976.

Hearings were held on March first and third by the Special Subcommittee on the National Science Foundation.

The following officials of the National Science Foundation testified:

H. Guyford Stever, Director

Norman Hackerman, Chairman, National Science Board

Richard C. Atkinson, Deputy Director

Harvey A. Averch, Acting Assistant Director for Science Education

Eloise E. Clark, Acting Assistant Director for Biological, Behavioral,
and Social Sciences.

Edward C. Creutz, Assistant Director for Mathematical and Physical Sciences, and Engineering
 Alfred J. Eggers, Assistant Director for Research Applications
 Robert E. Hughes, Assistant Director for Astronomical, Atmospheric, Earth, and Ocean Sciences, and Acting Assistant Director for Scientific, Technological, and International Affairs
 Other witnesses who testified were:
 Margaret Mead, Curator Emeritus of the American Museum of Natural History and Chairman of the Board of the American Association of the Advancement of Science
 Frank Hereford, President, University of Virginia (on behalf of the American Council on Education, Association of American Universities and National Association of State Universities and Land-Grant Colleges)
 Thomas Wenzlau, President, Ohio Wesleyan University (on behalf of the Associated Colleges of the Midwest and Great Lakes Colleges Association)
 Robert Silber, Executive Director, National Science Teachers Association
 Alan Nixon, Chemical Consultant
 James Sullivan, Research Director, National Council for Public Assessment of Technology
 Joel Primack, Author, *Advice and Dissent*
 Jewel Plummer Cobb, Member, National Science Board
 Alonzo Atencio, President, Society for Advancement of Chicanos and Native Americans in Science
 William Jackson, National Organization for the Professional Advancement of Black Chemists and Chemical Engineers
 Shirley Mahaley Malcom, Specialist in Minority and Women's Affairs, Office of Opportunities in Science, American Association for the Advancement of Science
 Additional statements were submitted for the record by:
 Glenn T. Seaborg, President, American Chemical Society
 Walter B. Waetjen, President, Cleveland State University (on behalf of the American Association of State Colleges and Universities, the Association of American Colleges, and the National Council on Independent Colleges and Universities)
 Franklin D. Hamilton, Associate Professor, University of Tennessee, Oak Ridge Graduate School of Biomedical Sciences; together with
 Vijaya L. Melnick, Associate Professor, Department of Biology, Federal City College
 Miles Mark Fisher IV, Executive Secretary, National Association for Equal Opportunity in Higher Education, Washington, D.C.

Correspondence

Correspondence expressing support and interest in the National Science Foundation's general program for fiscal year 1977 was received from:
 Harold Brown, President, California Institute of Technology; Pasadena, California
 William A. Fowler, President, The American Physical Society, New York, New York

H. O. Schorling, Executive Vice President, California State University, Fresno, California
 Calvin W. Burnett, President, Coppin State College; Baltimore, Maryland
 William Klemperer, Chairman, Department of Chemistry, Harvard University; Cambridge, Massachusetts
 C. Peter Magrath, President, University of Minnesota; Minneapolis, Minnesota
 Richard S. Caldecott, Dean, College of Biological Sciences; University of Minnesota; St. Paul, Minnesota
 Warren E. Ibele, Dean and Chairman, Research Officers Council, Graduate School, University of Minnesota
 R. J. Desnick, Associate Professor of Pediatrics and Genetics and Cell Biology, University of Minnesota
 Frederick Forro, Jr., Professor and Head, Department of Genetics and Cell Biology, University of Minnesota
 Douglas C. Pratt, Professor & Head, Department of Botany, University of Minnesota
 Dennis W. Watson, Professor and Head, Department of Microbiology, Medical School, University of Minnesota
 J. H. Wood, Director, Freshwater Biological Institute, College of Biological Sciences, University of Minnesota
 Robert A. Plane, President, Clarkson College; Potsdam, New York
 William R. Simmons, Director of Development, The Cooper Union; Cooper Square, New York
 Donald E. Brown, Assistant Vice President and Director of Government Relations, Hartwick College; Oneonta, New York
 Ralph L. Schuman, President, Nassau County, Science Supervisors Association, Nassau County, New York
 Clifford D. Clark, President, State University of New York at Binghamton; Binghamton, New York
 Frederick M. Binder, President, Juniata College; Huntingdon, Pennsylvania
 John W. Oswald, President, The Pennsylvania State University; University Park, Pennsylvania
 William G. Bowen, President, Princeton University; Princeton, New Jersey
 S. Munavallie, Professor and Chairman, Chemistry Department, Livingstone College; Salisbury, North Carolina

B. BACKGROUND

It is the responsibility of the National Science Foundation (N.S.F.) to advance scientific progress in the United States. The NSF carries out this mission by sponsoring basic research in all major fields of science and by sponsoring applied research in areas where results are closely linked to improvements in technology and economic productivity. The N.S.F. also has the primary responsibility within the federal government for strengthening science education in order to: ensure the nation an adequate pool of scientific and technological manpower with greater participation of minorities, women and handicapped individuals; improve science education to meet the needs of a broader range of students; promote public understanding of issues

involving science and technology; and improve the general effectiveness and efficiency of science education. The N.S.F. also sponsors: seven major research centers; international cooperative research efforts; and science policy research and analysis activities.

Eighty-seven percent of the N.S.F. program is performed by colleges and universities. This support is a major determinant of the strength of the U.S. basic research effort and is the key to the effectiveness of the college and university system in expanding frontiers of scientific knowledge. More than 1300 academic and non-profit institutions participate in NSF research and science education programs in all 50 states and the District of Columbia. In addition, a growing number of small R&D and other industrial firms are taking part in the Foundation's applied research programs, giving a new dimension to NSF research support activities.

In fiscal year 1975, for example, about 18,000 principal investigators—outstanding scientists and science educators—carried out Foundation supported programs with the assistance of more than 12,000 graduate students and technicians. During that period over 1650 graduate students held NSF fellowships and these young men and women selected 164 different institutions to pursue their education in science and engineering.

Seventy-eight percent of the total NSF budget is devoted to basic research—an area in which there has been a 23% decline in overall federal support, measured in constant dollars, since fiscal year 1968. The 19.5% increase proposed by the Administration for N.S.F.'s programs in this area will contribute to the effort to reverse this decline.

For fiscal year 1977 the National Science Board, the policy making body for the National Science Foundation, recommended a budget of \$852 million which was described by the Director of the NSF as follows: "It is a tight, fiscally responsible program geared to the need to make science and technology full partners in the effort to achieve economic growth, a high quality environment, and scientific strength in all major fields".

When the Office of Management and Budget approved a budget request of only \$802 million and made significant reductions in science education programs, the Director of the NSF stated: "I believe that these reductions would cut far too deeply into activities that are of great importance for maintaining the continued capability of U.S. Science." He further pointed out: "The declining performance of students in science and the increasing functional illiteracy of the general public in scientific matters make a substantial national effort in this area highly desirable."

The Committee's recommendation of a budget of \$832.4 million for the NSF for fiscal year 1977 plus the availability of \$10 million in funds deferred from fiscal year 1976, will ensure the continuity of science research and education efforts. It represents a 2.6% increase over the Administration's request and will mean that over the last five years the NSF budget has increased by an average of just 7% a year. The small increase recommended by the Committee will have a major impact on the NSF's programs devoted to science education, programs which have declined from \$120 million in fiscal year 1971 to just \$55 million (plus \$10 million in funds deferred from fiscal

year 1976) in the Administration's budget request in fiscal year 1977. During this period, support for science education has dropped from 26% of the NSF budget, to just 8%.

The \$832.4 million budget for the NSF recommended by the Committee will provide a balanced program and will ensure the continuity of research and science education efforts. It will permit the Foundation to sustain scientific strength in the major fields of science, and to support research directed to areas where there is a high potential for societal benefit or major advances in science.

II. Action in the Committee

S. 3202 was considered and reported unanimously, with amendments, by the Special Subcommittee on the National Science Foundation in open session on April 29, 1976. The full Committee on Labor and Public Welfare met on May 12, 1976, in open session to consider S. 3202 as reported by the Subcommittee. The Committee unanimously ordered the bill, as amended, reported to the Senate.

A. SUBCOMMITTEE ACTION

At the April 29th meeting of the Special Subcommittee on the National Science Foundation, the following amendments were considered:

An Amendment in the Nature of a Substitute to S. 3202

This amendment incorporates the recommendations and comments of members of the Subcommittee, the National Science Foundation, and interested individuals and groups during the hearings and following the introduction of S. 3202 by Senator Kennedy on March 24, 1976.

The funding levels authorized and the policy provisions of the amendment are discussed in full in Section III of this Report, "Fiscal Year 1977 National Science Foundation Program." The amendment was adopted unanimously.

An Amendment Authorizing State Science, Engineering and Technology Program

This amendment was filed by Senator Tunney on April 28, 1976. It authorized a \$10 million grant program to be administered by the National Science Foundation, to assist state governments in establishing and/or strengthening of science, engineering and technology advisory mechanism. The amendment was adopted unanimously, following adoption of Senator Stafford's amendment to reduce the authorization for the program to \$8 million.

An Amendment Providing for Employment, Advisory and Peer Review Participation by Handicapped Individuals

This amendment was offered by Senator Stafford to ensure an intensified effort by the Foundation in placing qualified handicapped individuals in executive positions at the Foundation, on advisory committees, and on review panels. The amendment was adopted unanimously.

B. FULL COMMITTEE ACTION

(1) At the May 12th meeting of the Committee, the following amendment was considered:

An Amendment Authorizing Funds for Forums, Conferences and Workshops Relating to the Handicapped in Science

This amendment was offered by Senator Javits to broaden the program "Minorities and Women in Science" to include emphasis on the needs and concerns of the handicapped. The amendment authorized \$500,000 for this purpose and re-titled the program "Minorities, Women, and Handicapped Individuals, in Science". The amendment was adopted unanimously.

(2) The Committee unanimously ordered S. 3202, as amended, reported favorably to the Senate. The following table summarizes the Committee's budget recommendations:

NATIONAL SCIENCE FOUNDATION—FISCAL YEAR 1977 BUDGET REQUEST AND COMMITTEE RECOMMENDATIONS BY PROGRAM ACTIVITY

(In millions of dollars)

Budget activity	NSF budget request			Committee recommendation	
	Fiscal year 1975 actual	Fiscal year 1976 current plan	Fiscal year 1977 proposed program	Fiscal year 1977 program	Difference (cols. 3-4)
Mathematical and physical sciences and engineering	180.9	193.4	233.3	233.3	0
Astronomical, atmospheric, earth, and ocean sciences	184.1	219.3	245.0	247.0	+2.0
Biological, behavioral, and social sciences	104.2	110.4	132.3	132.3	0
Science education	74.0	64.8	155.0	170.2	+15.2
Research applied to national needs	83.6	73.6	64.9	68.1	+3.2
Scientific, technological, and international affairs	24.9	22.2	22.0	24.0	+2.0
State science, engineering, and technology programs	0	0	0	8.0	+8.0
Program development and management	37.9	42.6	43.5	43.5	0
Subtotal, salaries and expenses appropriation	689.6	726.3	796.0	826.4	+30.4
Special foreign currency appropriation	3.6	5.3	6.0	6.0	0
Total, NSF	693.2	731.6	802.0	832.4	+30.4

¹ Does not include \$10,000,000 of fiscal year 1976 deferrals carried forward into fiscal year 1977.

III. Fiscal Year 1977 National Science Foundation Program

A. TITLE I—APPROPRIATIONS AUTHORIZED

1. Authorization for Activities of the National Science Foundation

Mathematical and physical sciences and engineering

	Millions
Actual fiscal year 1975	\$180.9
Estimate, fiscal year 1976	193.4
NSF request, fiscal year 1977	233.3
Committee recommendation, fiscal year 1977	233.3

The Foundation's budget request for the mathematical and physical sciences and engineering (MPE) for fiscal year 1977 totaled \$233.3 million. This is an increase of \$39.9 million over the current fiscal year 1976 plan. In each area, mathematical sciences, computer sciences, physics, chemistry, engineering, and materials research, activities are to con-

tinue to focus on fundamental research that may lead to improve technology and increase options for improving the quality of life. S. 3202 authorizes the full amount requested.

Mathematical sciences—the budget for mathematical sciences will increase from \$17.5 million in fiscal year 1976 to \$20.9 million in fiscal year 1977. Continued research support is to be provided for all areas of mathematics, including classical analysis, probability, and algebra. Research efforts are also to continue involving the development of mathematical techniques for application to the solution of problems in the biological and social sciences, as well as the physical sciences. Emphasis is to be placed on work in mathematical statistics and the mathematics of nonlinear waves. The latter is essential to work with high temperature plasmas, optical systems, and descriptions of atmospheric and oceanic phenomena.

Computer Sciences—Expanded support totaling \$51.8 million, is provided for fundamental research in computer science. This is an increase of \$3.3 million over the FY 1976 level of \$12.5 million. Increased emphasis is to be placed on studies aimed at increasing the quality and reliability of computer software, the technical aspects of privacy and security, and computer system fault tolerance. Increasing knowledge of solid state physics and materials properties can provide continuously smaller electronic devices for processing data. Such micro-computers could be used, for example, to optimize the total energy usage in a large building. Increased support is to be given to computer scientists who are attempting to determine the best practical algorithms, that is, steps toward solving complex problems with both ordinary and micro-computers. Support is also to be provided for a new research effort on the structure and management of very large data banks.

Physics—S. 3202 provides for a \$10.7 million increase in Physics Research with the total of FY 1977 rising to \$54.5 million, compared with \$44.8 million in FY 1976. Physics research support is to continue in elementary particle physics; intermediate energy physics; nuclear physics; atomic, molecular, and plasma physics; theoretical physics; and gravitational physics. Recent discovery of the so-called "narrow resonances" produced with accelerators has provided new insights and at the subnuclear level can only be examined experimentally with accelerators, which provide tremendous concentrations of energy in very small volumes. Increasing costs of electrical energy and tight budgets have severely curtailed the use of major physics research facilities. The increase will make it possible to make better use of these facilities. Research on plasmas is also to be expanded. Much work remains to be done in this rapidly growing field in order to provide a firm basis of knowledge for the eventual design of practical fusion reactors—an important step in the Nation's quest for plentiful, clean energy sources. S. 3202 also provides for the establishment, on a trial basis, of an Institute for Theoretical Physics.

Chemistry—S. 3202 includes \$42.3 million for fundamental research chemistry, \$6.9 million more than the FY 1976 level of \$35.4 million. Continued support is to be provided for research in all areas of chemistry to increase understanding of the laws and principles that govern the chemical transformation of matter. This research provides new knowledge on how molecules form, why they assume a particular

geometry or structure, and how interatomic and intermolecular forces influence the speed and direction of a chemical reaction. The Foundation's program will cover the entire range of fundamental research in chemistry, including such areas as chemical thermodynamics, quantum chemistry, synthetic inorganic chemistry, and synthetic organic and natural products chemistry, among others. Knowledge of the structure and behavior of liquids is far inferior to that of the gaseous and solid state. Expanded support for research on the liquid state is included in S. 3202. Catalysis holds great promise for decreasing the energy required to carry out important chemical reactions and increasing their rates. Increased research in this area is authorized for FY 1977. Increased emphasis will also be given to laser induced chemical reactions and to improved syntheses for the prostaglandins which regulate many life processes and which may be important to future advances in human health care.

Engineering—S. 3202 provides an increase of \$8.3 million for engineering bringing FY 1977 total to \$44.7 million as compared with \$36.3 million in FY 1976. Continued support will be available for research on engineering concepts to enable industry to conserve energy through reduced consumption and elimination of energy-intensive steps. The Foundation's engineering research will cover all of the engineering fields and include major efforts in electrical sciences and analysis, engineering chemistry and energetics, and engineering mechanics. Many fluid phenomena occur with more than one phase present; for example, the solid and liquid components present in coal slurries, the solid and gaseous components in combustion by flames, and fly ash in air pollutants, all represent two-phase systems. Increased research on the structure and behavior of such systems is required to solve some of the major problems involving energy and the environment. Pattern recognition is proving to be an invaluable tool in studying the weather, the distribution of natural resources, diseases of agricultural crops, and automation in industry. Expanded support is provided for research in this field.

By using beams of electrons or X-rays to etch surfaces with high precision, it is becoming possible to develop extremely small optical and electronic devices. Further research on these techniques may lead to small lasers and computers and open the way for optical communication and other information processing systems.

Enhanced research on turbulent mixing of fluids is to be undertaken to better forecast the properties of jets of pollutants entering bodies of water, or plumes of gases entering the atmosphere from a stack, and to gain further understanding of the interaction between winds and ocean waves.

Materials Research—S. 3202 includes \$54.1 million for Materials Research, \$7.3 million more than the FY 1976 level of \$46.8 million. Support is to continue for studies of the fundamental properties of materials to increase understanding of the behavior of materials in complex environments of technological importance, as well as for studies on materials-limited technologies. Brittleness is a serious limitation of many types of materials. What causes this and how it can be controlled is the subject of important research that will be supported by the increased funding. Metallic glasses are a relatively new type of material in which the metal atoms are not arranged in a

crystalline structure, but as an amorphous solid. Research on such materials with unique properties of corrosion resistance, strength, and ductility is to be expanded. Superconductivity, the ability of some materials to conduct electricity with no loss of energy whatsoever, is not well understood and research in this area is to receive increased support. Many important phenomena occur at surfaces. Such properties as catalytic activity, corrosion, and crack formation which occur at surfaces will be studied in FY 1977, using new techniques which have become available only recently.

Astronomical, atmospheric, Earth, and ocean sciences

	<i>Millions</i>
Actual fiscal year 1975.....	\$184.1
Estimate, fiscal year 1976.....	219.3
NSF request, fiscal year 1977.....	245.0
Committee recommendation, fiscal year 1977.....	247.0

The astronomical, atmospheric, Earth, and ocean sciences activity supports primarily basic research in several disciplines to increase understanding of the physical environment, both on Earth and in space. The research is pursued through several major programs and projects which have the following objectives: To acquire new knowledge in astronomy and the atmospheric sciences over the entire spectrum of physical phenomena; to arrive at better understanding of the physical and chemical makeup of the Earth and its geologic history; and to increase our insight into the oceans—their composition, structure, behavior, and resources.

The Foundation's budget request for these programs totaled \$245.0 million in fiscal year 1977, \$25.7 million above the fiscal year 1976 level of \$219.3 million. S. 3202 authorizes \$247 million for astronomical, atmospheric, Earth, and ocean sciences, an increase of \$2 million over the budget request. S. 3202 adds \$2 million to the budget request for oceanographic facilities and support and places a floor of \$21.2 million under the authorization for this program. The increase provided is to be available to meet the increasing cost of vessel operations, which resulted in a \$2 million deficit in fiscal year 1976. The rising cost of fuel has been a major factor in the cost of oceanographic facilities support, and was cited by the Director of the Foundation as "... a serious, serious problem."

Astronomical Sciences—This subactivity consists of astronomy project support and six National Research Centers in Astronomy. It includes research on the solar system, stars and stellar systems and motions, galactic and extragalactic astronomy, as well as development and operation of astronomical facilities and instrumentation. An increase of \$5.9 million (fiscal year 1976, \$48.8 million; fiscal year 1977, \$54.7 million) is provided for fiscal year 1977. This increase is to be used for expanded research in astronomy by university scientists, new instrumentation, upgrading of existing instrumentation, data processing, and initial operation of the very large array radio astronomy facility.

Atmospheric Sciences—Programs concerned with the Earth's atmosphere are atmospheric sciences project support, global atmospheric research program, climate dynamics program and the National Center for Atmospheric Research. Atmospheric sciences is a discipline in which knowledge of physics, chemistry, and biology is used and com-

bined in different ways to improve understanding of the atmosphere, and provide a basis for dealing with atmospheric problems. The \$7.2 million increase authorized (fiscal year 1976, \$44.2 million; fiscal year 1977, \$51.4 million) is to be used for research project support for the International Magnetospheric Study, for studies of the atmosphere and atmospheric pollution, and to prepare for the solar maximum period; planning for the first GARP global experiment and certain regional experiments; data analysis; acceleration of the climate dynamics program; and construction of a staging building for launching balloon flights at the National Scientific Balloon Facility.

Earth Sciences—Studies of the solid earth and the ocean floor are pursued by the Earth Sciences Project Support and the Ocean Sediment Coring Program. Research is supported to obtain basic information on the nature, origin, history and behavior of rock formations and the oceans' basins. Such information will help in understanding the forces that affect the earth's interior and modify its surface. An increase of \$6.6 million (FY 1976, \$25.6 million; FY 1977, \$32.2 million) is authorized for this program. This increase will permit the initiation of new research efforts that are part of the U.S. Program for the International Geodynamics Project. Emphasis will be given to testing of a plate tectonics model of the earth, geochemical studies of deep melting within the earth, and earthquake research to support the national effort in earthquake prediction and hazard reduction. Work will continue on the International Phase of Ocean Drilling.

Ocean Sciences—Studies of the Ocean are jointly planned for the Oceanography Project Support, the International Decade of Ocean Exploration, and Oceanographic Facilities and Support. The overall goal of the Ocean Sciences Program is improved understanding of the nature of the ocean and its influence on Man's activities and Man's impact on the marine environment. An increase of \$8.7 million (FY 1976, \$47.8 million; FY 1977, \$56.5 million) will provide support for the joint U.S.-U.S.S.R. POLYMODE experiment, studies of pollutants in the marine environment and the chemical reactions which change them into harmful or harmless compounds, continental shelf research, and increased operating costs of oceanographic research ships.

U.S. Antarctic Research Program—This program includes environmental research, and research related to mineral and marine resources. It is carried out within the context of the Antarctic Treaty and continues U.S. presence in that area. The net decrease of \$3.9 million (FY 1976, \$48.9 million; FY 1977, \$45.0 million) is a combination of several factors: nonrecurring costs of \$18.0 million for two LC-130R aircraft which were authorized in FY 1976; the restoration of research efforts to the planned FY 1976 level; and increases of \$13.3 million in operations support mainly due to the transfer of funding responsibility for DOD and DOT antarctic operation support functions to NSF.

Arctic Research Program—This program extends research in the Arctic while strengthening and broadening U.S. arctic research capabilities. Work is supported in the areas of environmental research, resource related research, and socio-economic research. The authorized increase of \$1.3 million (FY 1976, \$4.0 million; FY 1977, \$5.3 million) provides for expanded efforts in glaciology, atmospheric sciences, polar biology, earth sciences research, and for a Bering Sea ecosystems program.

Biological, behavioral, and social sciences

	<i>Millions</i>
Actual fiscal year 1975.....	\$104.2
Estimate, fiscal year 1976.....	110.4
NSF budget request, fiscal year 1977.....	132.3
Committee recommendation, fiscal year 1977.....	132.3

The Foundation's FY 1977 Budget request for Biological, Behavioral and Social Sciences totalled \$132.35 million, \$21.9 million more than the FY 1976 level. S. 3202 authorizes the full amount requested in order to provide expanded research in areas related to energy, the environment, food, resources, productivity, inflation and employment.

For fundamental research in Physiology, Cellular and Molecular Biology, S. 3202 provides \$54.3 million, \$9.6 million over the FY 1976 level. It provides for expanded biochemical and physiological research in plant-related sciences. Particular emphasis is to be given to photosynthesis and nitrogen fixation; molecular biological methodologies which lead to increased sensitivity of measurement and extend the range of parameters; exploitation of opportunities for research in genetics and differentiation now available through new cell culture capabilities; and increased understanding of hormone action and the interactions between different kinds of macromolecules.

For the Behavioral and Neural Sciences, S. 3202 provides \$24.4 million, an increase of \$4.7 million over the FY 1976 total. The research effort is to focus on key aspects of behavior and the nervous system during early development; research on brain structure and its function in cognitive processes; and anthropological research including studies of the impact of technology on change in nonwestern cultures.

For Environmental Biology, S. 3202 provides an increase of \$4.4 million to a total of \$32.5 million in FY 1977. Emphasis is to be given to studies to advance understanding of population biology and physiological ecology, tropical biology, aquatic ecosystems, space-time patterns in ecosystems and ecosystem modelling.

S. 3202 includes \$21.2 million for the Social Sciences, an increase of \$3.2 million over FY 1976. Funding for this program has been approximately level for the past two years. Support is to continue for fundamental research to increase understanding of how human being interact and how man-made organizations and institutions function. Provision is to be made for: increased study of economic theory and advanced measurement techniques to analyze inflation, energy, resources, productivity, and international economic problems; and increased support for new studies on the changing structure of political systems.

Science education programs

	<i>Millions</i>
Actual fiscal year 1975.....	\$74.0
Estimate fiscal year 1976.....	64.8
NSF budget request, fiscal year 1977.....	55.0
Plus fiscal year 1976, deferrals.....	10.0
Total available, fiscal year 1977.....	65.0
Committee Recommendation, fiscal year 1977.....	70.2
Plus fiscal year 1976 deferrals.....	10.0
Total available, fiscal year 1977.....	80.2

The budget request for the Foundation's Science Education programs included \$55 million of new funding and \$10 million of fiscal year 1976 funds deferred into fiscal year 1977, for a total program of \$65 million. The Committee has approved \$70.2 million of new funding, which, together with the \$10 million carried forward from 1976, provides for a total program of \$80.2 million for fiscal year 1977, or \$15.2 million over the budget request. The Committee has placed floors under a number of the authorizations within this total.

The goal of the Science Education Program Activity is to "initiate and support . . . programs to strengthen . . . science education program at all levels . . ." as directed in PL 81-597, as amended, Section 3. (a) (1). To accomplish this goal the Foundation provides, on a competitive basis, support for institutions to improve their capabilities for teaching science and engineering; for needed innovations in curricula, materials, and technologies for teaching science and engineering. Support is given to individuals to enable them to pursue careers in the sciences and engineering. The overall program structure in which existing programs are located has been revised by the Foundation so that program results can more easily be identified and their effectiveness evaluated. Continuing efforts to accomplish program objectives in more effective fashion initiated during fiscal year 1976 are expected to receive emphasis in fiscal 1977.

S. 3202 authorizes funds for fiscal year 1977 as follows:

Science Manpower Improvement—(\$27.5 million): Funds are provided to encourage highest quality standards in students and institutions by providing support for fellowships, traineeships and other student-oriented activities; to provide continuing education for scientists and engineers; and to increase the entry into science of women, minorities, and the handicapped, historically underrepresented in these fields.

S. 3202 places a floor of \$16 million under programs for "Graduate Fellowships in Science and Engineering" and "National Needs Fellowships". This will enable the Foundation to more closely approach the recommendation of the National Board of Graduate Education that the National Science Foundation should be supporting 1,000 rather than 500 new fellowship starts per year. A detailed description of the continuing education activities and programs for minorities and women, and the handicapped, is included in part B.

Science Education Resources Improvement—(\$35.9 million): Funds are provided to strengthen the science education and research training capabilities of schools, colleges, and universities, and to stimulate the incorporation of new knowledge and instructional strategies in science teaching.

S. 3202 places a floor of \$15 million under the program "Comprehensive Assistance to Undergraduate Science Education", with the further provision that priority will be given to applications from two-year and four-year institutions of higher education which do not grant a doctor's degree in science or engineering.

A floor of \$6 million is established for the program "Research Initiation and Support" (RIAS), with a specification that not less than 40 percent of this amount is to be available on a competitive basis to institutions of higher education granting doctoral degrees in the sciences or engineering which received research support from the National Science Foundation during fiscal year 1976 and for which total Federal

research and development per graduate student in science and engineering was substantially less than the national average.

The set-aside is intended to achieve a more equitable and ultimately more effective distribution of RIAS awards. A recent NSF study, conducted at the request of Senator Laxalt revealed that the top 20 institutions receiving its support received on a per capita basis for their full time graduate science and engineering students more than \$4,200. At the opposite end of the spectrum, a large number of institutions enrolling more than 40 percent of the same population received a disproportionately small share of the total NSF obligation. On a per capita basis, these institutions received only \$700.

The RIAS program is aimed at strengthening university training and research programs for young graduate and postgraduate level scientists. Without the imposition of the set-aside the Foundation would be likely to award these grants on essentially the same competitive basis that it has used on other programs. As a result, the continued concentration of NSF funding among a limited number of institutions would be likely. But, because the major objective of RIAS is to improve the effectiveness, efficiency, and quality of these programs for young scientists, and not to make immediate basic research contributions, the traditional distribution of awards among select institutions would not be appropriate.

The Foundation is left considerable discretion in determining eligibility for the set-aside. However, the Foundation is advised to refer to S. 3179, introduced by Senator Laxalt, as a guideline for such criteria. The Committee will be monitoring carefully the RIAS program with the expectation that a departure from the traditional funding patterns may result.

S. 3202 places a floor of \$2 million under a program of planning grants for the design of Minority Centers for Graduate Education in Science and Engineering, the details of which are described in part B.

Science Education Development and Research—(\$11.7 million): This program is to identify and develop technologies, methods and course materials to increase the effectiveness of science instruction at all educational levels. S. 3202 authorizes the full amount requested by the Foundation.

A partial listing of those who contacted the Committee to express particular interest in pre-college science education programs follows: Katherine H. Aratani, Kamehameha Schools, Bernice Pauahi Bishop Estate; Honolulu, Hawaii.

Arnold B. Arons, University of Washington; Seattle, Washington.
Al Alvarez, San Antonio Independent School District, San Antonio, Texas.

Lawrence E. Armstrong, Gorham Fayette High School; Fayette, Ohio.
Edwin A. Boger, Worcester State College; Worcester, Massachusetts
Milo K. Blecha, The University of Arizona Tucson, Arizona
Bill Bliss, Educational Services Center Lynnwood, Washington
David P. Butts, Journal of Research in Science Teaching; Athens, Georgia

Leonard C. Blessing, Millburn Township Public Schools; Millburn, New Jersey

Ludwig Braun; Dix Hills, New York

O. K. Beatty, Livingstone College; Salisbury, North Carolina

Rolland B. Batholomew, Department of Geological Sciences; The University of Texas at Austin, Austin, Texas
 William R. Brown, Department of Curriculum & Instruction; Norfolk, Virginia
 Mitchell E. Batoff, Jersey City State College, Jersey City, New Jersey
 John Butler, Humboldt State University, Arcata, California
 Glenn D. Berkheimer, Science and Mathematics Teaching Center; Michigan State University; East Lansing, Michigan
 Richard J. McLeod, Science and Mathematics Teaching Center, Michigan State University; East Lansing, Michigan
 Jacob W. Blankenship, Association for the Education of Teachers in Science; Houston, Texas
 Robert DeBlasi, New Jersey Science Supervisors Association; Rockaway Twp., New Jersey
 Irene R. Barton, Newington Public Schools, Newington, Connecticut
 Sister Jean Mark Buckler, Board of Education of Marion County, Levanon, Kentucky
 Ralph E. Bachus, Boulder Valley Public Schools; Boulder, Colorado
 Lawrence Benne, Area Education Agency; Sioux City, Iowa
 Lawrence Buford, Texas Science Supervisors Association, Austin Independent School District, Guadalupe; Austin, Texas
 J. Darrell Barnard, New York University; New York, New York
 John E. Chambers, Governors State University; Park Forest South, Illinois
 Pamela S. Cromer; Lexington, South Carolina
 George Coklas, Minneapolis, Minnesota
 Warren Classon, National Science Supervisors Association; Davenport, Iowa
 Alan Cram, Jefferson County Public Schools; Littleton, Colorado
 Janet Christianson; Northglenn, Colorado
 Mervin D. Denton; Thomas J. Lawson; Verda McCullough; McComb Public Schools; McComb, Mississippi
 Elizabeth J. Durrell; Woburn, Massachusetts
 Ken Dixon; Oak Creek, Colorado
 Martha Nell Dodson, Oklahoma City Public Schools; Oklahoma City, Oklahoma
 Richard Ebeling, West Aurora Schools; Aurora, Illinois
 Irvin T. Edgar, Hummelstown, Pennsylvania
 Brenda Forester, Governors State University; Park Forest South, Illinois
 David L. Fagle, Marshalltown, Iowa
 Kenneth L. Frazier, North Olmstead High School; North Olmstead, Ohio
 Clifford T. Frederickson, San Diego Schools; Encinitas, California
 Jack B. Friedman, Syosset High School; South Woods Road, Syosset, New York
 Peter Finner, College of Environmental and Applied Sciences, Governors State University; Park Forest South, Illinois
 Iva Nell Fortenberry, Monticello High School; Monticello, Mississippi
 Thomas C. Fitch, Robert L. Fisher, Illinois State University; Normal, Illinois
 Science Faculty, Fairview High; Boulder, Colorado
 Janet Fleharty, Colorado Springs, Colorado

John R. Gamble, Office of the Superintendent of Public Instruction; Carson City, Nevada
 F. Raylene Goeken; Denver, Colorado
 Don Gabriel; Brush, Colorado
 S. L. Giuliani, San Diego City Schools; San Diego, California
 Donald K. Goe, Cherry Cheek Schools; Englewood, Colorado
 James Gemmell, Clarion State College; Clarion, Pennsylvania
 Richard E. Haney, The University of Wisconsin; Milwaukee, Wisconsin
 Sister Mary Hertrich, Ohio Dominican College; Columbus, Ohio
 Lyle C. Hall, University of Wisconsin; River Falls, Wisconsin
 Guy B. Hommon, Emporia Kansas State College; Emporia, Kansas
 Robert E. Holtz, Concordia College; St. Paul, Minnesota
 Jerry G. Horn, Educational Research and Service Center, School of Education, The University of South Dakota; Vermillion, South Dakota
 Howard J. Hausman; Silver Spring, Maryland
 Harold R. Hungerford, Department of Elementary Education, University at Carbondale; Carbondale, Illinois
 Paul Hendrickson, Frazee, Minnesota
 John W. Butzow, College of Education, University of Maine, Orono; Maine
 Joseph E. Goodness, Jr., Maine Science Teachers Association; Sanford, Maine
 Wayne B. Jennings, St. Paul Open School; St. Paul, Minnesota
 Clayton H. Johnson, Department of Geology, The University of Missouri-Columbia, Columbia, Missouri
 Fred D. Johnson, Shelby County Schools; Memphis, Tennessee
 M. Lynn James, Department of Chemistry; The University of Northern Colorado; Greeley, Colorado
 Robert James, Department of Curriculum and Instruction, Kansas State University; Manhattan, Kansas
 Franklin M. Jones, Radford, Virginia
 Terry Kwan, The Public Schools of Brookline; Brookline, Massachusetts
 Kenneth G. Kamps, University of Wisconsin; Platteville, Wisconsin
 Paul J. Kuerbis, The Colorado College; Colorado Springs, Colorado
 Joseph G. Krajovich, Public Schools of Edison Township; Edison, New Jersey
 Ernest Knight, Department of Biology, Eugenio Maria de Hostos Community College of the City University of New York; Bronx, N.Y.
 Arie Korporaal, Los Angeles County Education Center; Downey, California
 James L. Kelly, Department of Teaching, University of Northern Iowa; Cedar Falls, Iowa
 Jean Krause, Greeley Public Schools; Greeley, Colorado
 David P. Kielbowick, Science Department, Ambridge Area High School; Ambridge, Pennsylvania
 Morris R. Lerner, Science High School; Newark, New Jersey
 Victoria F. Larsen, Austin Independent School District; Austin, Texas
 Roger D. Lewis, Educators Consulting Services; Conway, Arkansas
 Joyce J. Linton, Westview Elementary School; Denver, Colorado

William G. Lamb, Department of Biological Sciences, Delta State University; Cleveland, Mississippi
 Eleanor Longbrake, Toledo Public Schools; Toledo, Ohio
 Vaughn Larson, Cooper Elementary School; Hastings, Minnesota
 Edward M. Mueller, Neehah Joint School District; Neehah, Wisconsin
 Theresa M. Monaco, Department of Curriculum and Instruction, University of Houston; Houston, Texas
 Donald W. McCurdy, Department of Secondary Education, The University of Nebraska-Lincoln; Lincoln, Nebraska
 Victor J. Mayer, College of Education, The Ohio State University; Columbus, Ohio
 Bernard E. Michals, California State College; Bakersfield, California
 Ralph J. Miller, Educational Projects Development; Greenville, Illinois
 Lillian C. McDermott, Department of Physics, University of Washington; Seattle, Washington
 Del McNally, Jefferson County Public Schools, Wheat Ridge Senior High School; Wheat Ridge, Colorado
 John P. Mallan, American Association of State Colleges and Universities; Washington, D.C.
 Kenneth R. Mechling, Clarion State College; Clarion, Pennsylvania
 Willima H. Owen; Englewood, Colorado
 James R. Okey, Department of Science Education, The University of Georgia; Athens, Georgia
 Melba Phillips, American Association of Physics Teachers, Stony Brook; New York
 Albert P. Nous, School of Education, University of Pittsburgh; Pittsburgh, Pennsylvania
 Edward P. Ortleb, St. Louis Public Schools and National Science Teachers Association; St. Louis, Missouri
 Lester G. Paldy, Department of Physics, State University of New York; Stony Brook, New York
 John C. Pittenger, Pennsylvania Department of Education; Harrisburg, Pennsylvania
 Sister Carmen Preulx-S.P., Rice Memorial High School; South Burlington, Vermont
 Harold Pratt, Jefferson County Public Schools; Lakewood, Colorado
 Janet Poduska, Anoka-Hennepin Independent School; Anoka, Minnesota
 Richard W. Peace, Prairie School; New Raymer, Colorado
 Richard S. Peterson, Utah State Board for Vocational Education, Utah State Board of Education; Salt Lake City, Utah
 Francis Roberts, Bank Street College of Education; New York, New York
 F. James Rutherford, Department of Science Education; New York University; New York, New York
 David D. Reid, Jefferson County Public Schools, Alameda Senior High School; Lakewood, Colorado
 Art Romnes, John Glenn Junior High School; North St. Paul, Minnesota
 Wayne R. Schade, Austin Independent School District; Austin, Texas
 John Stevens, Department of Education; Montpelier, Vermont

Harry F. Syrenne, Massachusetts Association of Science Supervisors; Southwick, Massachusetts
 Joseph Struthers, Mesa Elementary School; Boulder, Colorado
 Carol Stedman, Science Association of Tennessee; Nashville, Tennessee
 Larry Small, Schaumburg, Illinois
 Frank A. Smith, Jr., West Chester State College, Department of Physics; West Chester, Pennsylvania
 Frank L. Sullivan, Biology Department, State College at Salem; Salem, Massachusetts
 Walter Saunders, Department of Secondary Education, Utah State University; Logan, Utah
 Kenneth P. Schoonover, Arapahoe County School District; Littleton, Colorado
 Marvin G. Spencer, Board of Education of Frederick County; Frederick, Maryland
 John Strattan, Jefferson County Public Schools; Louisville, Kentucky
 Dallas Stewart, Athens, Georgia
 Audrey N. Tomera, Department of Curriculum, Instruction and Media; Carbondale, Illinois
 Michael R. Thompson, Mathematics Department, Highlands High School; Lakewood, Colorado
 Roy Unruh, Department of Physics, The University of Northern Iowa; Cedar Falls, Iowa
 David Wayne Vargo, Jefferson County Public Schools, Wheat Ridge Senior High School; Wheat Ridge, Colorado
 Virginia Way, School District of Adams County; Westminster, Colorado
 George L. Uebel, Spring Valley, Wisconsin
 Rosly Walter, Ginn and Company; Lincoln, Massachusetts
 Frank Wing, Carl Sanburg High School; Orland Park, Illinois
 Charles A. Wall, Del-Mod System; Delaware, New Jersey
 Herbert A. Wolfer, Randolph Public Schools; Randolph, Massachusetts
 Guy O. Wall, Indiana University Southeast; New Albany, Indiana
 Janice J. Withington, Jefferson County Public Schools; Lakewood, Colorado
 Paul Eugene Wolter, Wadena Public Schools; Wadena, Minnesota
 Robert D. Williams, Golden, Colorado
 James Weigand, Science Education, Indiana University; Bloomington, Indiana
 Robert E. Yager, Science Education, The University of Iowa; Iowa City, Iowa
 Henry C. Zabierek, The Public Schools of Brookline; Brookline, Massachusetts
Science and Society—(\$5.1 million): The objectives of this program are: to increase public understanding of science and technology; to increase public understanding of public policy issues involving science and technology; to increase the public understanding of the role of science and technology in meeting national needs; and to focus on the ethical and human value implications of science and technology: It is designed to increase both the amount and quality of communication between the scientific community and the public, and to increase the use of science by the public.

A \$1 million floor is placed under the program of "Ethical and Human Value Implications of Science and Technology", including ethical and value issues arising in the context of physical science, biological science, and clinical medicine. A floor of \$3 million has been established under the Science for Citizens program including an augmented Public Understanding of Science Program; the details of which are described in part B.

Research applied to national needs

	<i>Millions</i>
Actual fiscal year 1975.....	\$83.6
Estimate, fiscal year 1976.....	73.6
NSF budget request, fiscal year 1977.....	64.9
Committee recommendation, fiscal year 1977.....	68.1

The Foundation's program of Research Applied to National Needs (RANN) focuses U.S. scientific and technical resources on selected problems of national importance for the purpose of contributing to their timely, practical solution. RANN serves as a bridge between the Foundation's basic research programs and the development, demonstration, and operational programs of Federal mission agencies, State and local governments, and industry. RANN is coordinated from the program to the project level with the related efforts of these institutions.

The budget request included \$64.9 million for Research Applied to National Needs, to focus U.S. scientific and technical resources on selected problems of national importance. S. 3202 provides an authorization of \$68.1 million, or \$3.2 million above the Administration request. A floor of \$10 million is placed under the program of "Earthquake Engineering" and a floor of \$2 million is established for a program of Small Scale Research on Advanced Energy Forms. S. 3202 also specifies that not less than 10 percent of the amount authorized for the program of Research Applied to National Needs shall be expended to small business concerns.

The reduction of \$5.5 million in this program for fiscal year 1977 reflects the further phasedown and shift to other government agencies of research in the areas of energy resources, environmental effects of energy, and fire research.

Activities authorized for fiscal year 1977 include the following:

Resources—Research supported under the RANN Resources program is to be directed toward improving the Nation's management of its natural resources by developing alternative solutions to emerging scarcity problems before the crisis stage is reached as it was with petroleum. Resources Systems, Renewable Resources, and Nonrenewable Resources are to be addressed. Special emphasis in these areas is to be placed on comprehensive analyses of mineral market behavior and alternative renewable and non-renewable resources; on research to develop new technologies to increase the yield and reduce the energy intensiveness of resource extraction; on small scale research on advanced energy forms; and on research to reduce waste in resource utilization. The reduction in funding of this program in fiscal year 1977 reflects the further phase down and shift of primary responsibility for energy resources research to the Energy Research and Development Administration (ERDA).

Environment—Research supported under the RANN Environment program is to be directed toward enhancing the Nation's capability to mitigate environmental hazards, whether natural or man caused. This research addresses two major problem areas: Managing the Natural Environment, and Disasters and Natural Hazards. Special emphasis in these areas is to be placed on chemical threats to the environment and man, regional environmental management, earthquake engineering, weather modification, and societal response to natural hazards. Responsibility for fire research will be phased down and shifted to the Department of Commerce in accordance with P.L. 93-498, and research on the environmental effects of energy is being transferred to ERDA.

Productivity—The basic objective of the RANN Productivity program is to support policy reach and experiments with new technologies to help improve the productivity of the public and private sectors of the economy.

Research on public sector productivity will focus on the most cost effective use of technology, capital, and human resources in service delivery, including especially health care, emergency and welfare services. Research on private sector productivity problems emphasizes Advanced Industrial Processes and Regional Productivity Research. This effort will bring to bear unique combinations of research capabilities of universities and industry, including small businesses, with special emphasis on the development and application of advanced technologies and systems analysis to production processes that are industrially fragmented or regionally separated.

Underlying these efforts will be policy research to improve the measurement of public and private sector productivity, to analyze the distributional and equity issues involved in the allocation of the benefits of productivity gains, to analyze the effects of government regulations on national productivity, and to determine the effects on productivity of institutional relationships between labor, management, and government.

Intergovernmental Science and R&D Incentives—The basic objectives of this RANN program are to ensure that science and technology are effectively integrated into the policy planning, program planning, and program execution activities in State and local governments, and to test and evaluate selected incentives which the Federal Government may properly and effectively use to increase R&D investment in the private sector where new technology is needed in the national interest.

The Intergovernmental Program element will place emphasis on increasing the awareness of public officials of science and technology issues, experimenting with improved science and technology delivery systems, facilitating the replication of successful experiments, mobilizing additional science and technology resources in the public and private sectors to work on State and local government problems, and increasing the communication and information exchange between and across various levels of government. Special attention is to be given to the need for continuation and/or expansion of the Urban Technology System and the expertise and resources it has made available to assist

in the identification and solution of problems based on local needs and priorities. The Industrial program element will place special emphasis on incentives for innovations by small businesses and on incentives to accelerate the introduction of new technologies and systems in the mining and public works industries.

Exploratory Research and Technology Assessment—This program will support research and assessment efforts to provide greater visibility on the longer range social, environmental and economic impacts of new technology applications, and to identify and analyze emerging national problems which may be avoided or ameliorated by effective applications of science and technology. Special emphasis is to be placed on research and assessment studies of important issues posed by the continuing trends toward a resource-scarce and environment-limited economy. These issues include the socioeconomic and environmental impacts of large scale application of new technologies for low grade ore extraction.

This program recognizes as a long term trend of potentially devastating importance, the tendency for the economy to become "closed cycle" because of the increasing requirements for reuse and renewal of resources. This trend demands a much deeper understanding of the opportunities for and consequences of using science and technology for the effective operation of such an economy. The Exploratory Research and Technology Assessment program, under RANN, is well equipped and situated to deal with this significant emerging national problem.

Scientific, technological, and international affairs

	<i>Millions</i>
Actual fiscal year 1975.....	\$24.9
Estimate, fiscal year 1976.....	22.2
NSF budget request, fiscal year 1977.....	22.0
Committee recommendation, fiscal year 1977.....	24.0

The Scientific, Technological, and International Affairs activity (STIA) collects data, supports research, conducts studies, administers international science activities, and undertakes science and technology policy analysis, providing advice on how science and technology can better meet national economic and social objectives. This activity includes International Cooperative Scientific Activities, Science Information Activities and a new program group—Science Assessment, Policy and Planning—which contains Science Resources Studies, Policy Research and Analysis, and NSF Planning and Evaluation.

S. 3202 includes \$24 million for Scientific, Technological, and International Affairs, an increase of \$2 million over the budget request. The increase is provided to strengthen the ability of the Foundation to discharge its responsibilities under the National Science and Technology Policy, Organization, and Priorities Act of 1976. The Office of Science and Technology Policy being established within the Executive Office of the President will be relying heavily on the manpower and funding data base which the Foundation has assembled, as well as on the additional information sources and staff resources of the Foundation. S. 3202 recognizes that additional funds will be required for these efforts.

Major program elements authorized for fiscal year 1977 are:

International Cooperative Scientific Activities—[\$8.7 million]. The main emphasis of this subactivity will be to foster international cooperation between U.S. scientists and their foreign colleagues through its support of U.S. participation in joint research and exchange activities. There will be new regionally oriented joint programs as well as increased support of the 21 cooperative programs for which the Foundation is responsible and the growing scientific and technological activities of the Joint Commissions for Economic Cooperation. In addition, increased support is authorized to cover rising costs of participation in international organizations and expanded dollar support for Special Foreign Currency projects.

Science Information Activities—[\$6.0 million]. This subactivity will stimulate and support efforts to improve accessibility and use of scientific and technical information. Although no increase in total funding is provided, \$200,000 will be reallocated from the program's applied research support to stimulate increased basic research on the process of information transfer.

Science Assessment, Policy, and Planning—[\$9.3 million]. The objective of the Science Resources Studies [SRS] program is the development and maintenance of a current factual and analytical basis for planning and policy formulation in the area of science and technology resources. An increase of \$400,000 is provided to better enable SRS to fulfill its statutory responsibility in the area of manpower studies. The Policy Research and Analysis program will examine the impact of science and technology on the full range of national interests and develop policy option analyses regarding relevant Federal actions. NSF Planning and Evaluation will support research and analysis designed to strengthen the Foundation's ability to plan and improve its programs and management activities.

State science, engineering, and technology programs

	<i>Millions</i>
Actual fiscal year 1975.....	0
Estimate, fiscal year 1976.....	0
NSF budget request, fiscal year 1977.....	0
Committee recommendation, fiscal year 1977.....	\$8.0

S. 3202 authorizes \$8 million for a program of "State Science, Engineering, and Technology Programs". This program will provide grants to State executive and legislative branches for establishment of science and technology offices to enhance the ability of State governments to apply science, engineering, and technology to the needs of their citizens. The details of this program are described in part B.

Program development and management

	<i>Millions</i>
Actual fiscal year 1975.....	\$37.9
Estimate, fiscal year 1976.....	42.6
NSF budget request, fiscal year 1977.....	43.5
Committee recommendation, fiscal year 1977.....	43.5

The Program Development and Management (PD&M) activity provides for the operation, support, management and direction of all NSF programs and activities and includes the salaries and operational

expenses of NSF staff and the National Science Board. \$43.5 million was requested for this activity in fiscal year 1977. S. 3202 authorizes the full amount requested.

The \$43,500,000 provided for this activity in FY 1977, although an increase of \$1,330,000 over the fiscal year 1976 level, will only be sufficient to maintain the FY 1976 level of overall operation in support of 1,300 permanent positions.

The overall increase includes \$830,000 for: staff compensation; staff and consultant travel resulting from increases in per diem and transportation rates; space rental; increased costs of contractual services provided on a reimbursable basis by other government agencies (GSA, Federal Audit Agency, etc.); equipment rentals; communications and equipment other cost increases of goods and services. Also, an amount of \$50,000 is included for a full year personnel compensation and related costs of ten positions to staff and manage the NSF portion of multi-agency joint Commission Activities for development and implementation of cooperative science programs in the middle East and India.

2. Program Administration

(a) Acknowledgement of Support and Responsibility for Findings

Whenever any material is published which is based on or developed under a project assisted by the National Science Foundation, S. 3202 requires that it must be accompanied by an acknowledgement of that support and a statement as to whether the author(s) or the Foundation is responsible for the findings, opinions, conclusions or recommendations contained in that material.

At present, the Foundation expects a "disclaimer" and acknowledgement of support to appear in such material. However, the requirement has not been applied uniformly and has become an issue in connection with materials which address issues of potential controversy or significant relevance to public policy issues.

The following language is recommended to carry out the provisions of this requirement of S. 3202.

This material is based upon research supported by the NSF under Grant No. (Contract No.) -----;
and

Any opinions, findings and conclusions or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect the views of the National Science Foundation;

or

Any opinions, findings and conclusions or recommendations expressed in this publication reflect the views of the National Science Foundation.

(b) Dissemination of Reports through the National Technical Information Service of the Department of Commerce

S. 3202 directs the National Science Foundation to arrange for the dissemination of all substantive technical reports, including policy and applied research material, through the National Technical Information Service (NTIS) of the Department of Commerce. This dissemination to NTIS must occur within sixty days of the receipt of reports or of the notification of their completion.

The dissemination of these reports through NTIS, which makes available reports and journal articles describing the results of the Federal Government's research, development, testing and evaluation program, will improve the availability of and access to results of Foundation-funded research. It is expected that this requirement will be of substantial assistance to federal, state and local agencies and non-profit organizations seeking research results and findings for use in understanding and resolving issues and problems with significant scientific and technical components. The requirement is designed to supplement existing efforts to ensure that the nation realizes the greatest possible return on its investment in research supported by the National Science Foundation.

(c) Reports on the Utilization of Applied Research

Research funded under the Directorate for Research Applications (RANN) must ultimately be subjected to a criterion for success or failure quite different from that employed for traditional basic research.

A basic research project is deemed to "succeed" if it meets the standards set by the scientific community, for example, that the data collected be accurate and useful, that the theoretical model be mathematically consistent and capable of accounting for some body of experimental data. The object of the applied research funded by RANN is not only to advance the state of knowledge in a field, but to hasten the application of such knowledge to the realistic solution of important practical problems. As such, the research is to be judged, not by scientific criteria alone, but also in terms of its practical utility.

This change in emphasis is a subtle but very important one, and distinguishes RANN from the other National Science Foundation research directorates in many substantive ways. For example, RANN-sponsored research is usually focused on a "customer", or user, at whose needs, desires, and limitations the research is necessarily directed. The RANN researcher, while being required to meet the usual standards for scientific and technical competence, cannot afford, and must not be allowed, the luxury of defining his own problem, and solving it to his own satisfaction and that of a few colleagues working in the same area. Research problems and constraints are largely externally defined, and success or failure must be judged at least in part by "customer satisfaction".

Recognizing the foregoing considerations, S. 3202 requires that recipients of RANN funds must file with NSF a Utilization Report, within one year of the completion of the grant or contract. In requiring this report, the Committee recognizes that the likelihood of "success" of any individual research project in terms of clearly definable utilization within one year is not high. Indeed, were it otherwise it might be an indication that the RANN management was not being sufficiently imaginative in funding speculative research. The Committee feels strongly that it is not the proper function of government to fund "sure things", particularly in the area of applied research. Such funding is better left to the private sector and the profit motive. Thus, it is to be expected that in the area of high-risk, innovative research, the projects which are of immediate and direct utility will necessarily be a small fraction of the total. Nevertheless, the Committee feels that it would be instructive for the Foundation, as well as a useful oversight

function, to examine, one year later, the practical effects, if any, that a particular piece of research has had.

The Committee emphasizes that the Utilization Report called for in this bill need not be lengthy or complex. It should address the degree of utilization of the research, and the uses which it may find in the future. It is understood that this report will be submitted to the Foundation, and that it will be available for examination by the Congress and the public.

The Committee further feels that although emphasis is properly placed on research utilization as a criterion for the evaluation of applied research projects, it is not the only one. The danger of excessive caution in the choice of applied research projects to be funded—with the aim of maximizing the probability of utilization—are as real as that of funding inherently impractical projects of high scientific interest but no likely utility.

d. Feasibility Study of "Blind" Peer Review

S. 3202 directs the Foundation to initiate a study of the effect of evaluating proposals by a "blind" peer review system, in which the identity of the researcher originating the proposal is not made known to the reviewers of that proposal. The Committee suggests that an effective way to carry out such a study would be to choose at random a reasonable number of incoming proposals in various fields, and perform "blind" reviews on them in parallel with the usual review process. Although such reviews would not be used in the actual evaluation of the proposals for purposes of determining whether or not to fund them, the results obtained by the two methods could be easily and quickly compared in this way.

B. TITLE II—NATIONAL AND INTERNATIONAL NEEDS AND RESOURCES

1. INTERNATIONAL SCIENTIFIC RESEARCH, EDUCATION, AND POLICY ANALYSIS

The National Science Foundation is uniquely qualified to help in focusing the scientific and technical resources of the Nation on international food and nutrition problems. It is in close touch with the finest researchers and research facilities in this Nation. It has access to the Nation's best scientific and technical talent. Over its 25-year history it has supported basic research which has led to significant advances in our knowledge here at home and has strengthened the position of the United States as a leader in the world scientific community.

The National Science Foundation has the authority under its enabling legislation to initiate and support scientific activities that bear not only on domestic problems but that deal with problems that beset other societies or that are international in scope. This authority was granted not only to insure that our Nation and our scientists could benefit from scientific facilities and developments abroad, but to insure that the scientific and technical expertise of this country could be made available to other nations and to the global community in general.

S. 3202 directs the Foundation to exercise fully its authority to initiate efforts to focus scientific and technical resources on interna-

tional food and nutrition problems as a priority area within its overall mission to promote the progress of science.

Most of the Foundation's existing international cooperative activities and bilateral agreements (primarily for the exchange of scientific and technical information between U.S. and foreign scientists) are now administered by the Foundation's directorate for Scientific, Technical and International Affairs. In the case of the U.S.—U.S.S.R. cooperative agreements for the conduct of joint research, the Foundation is the lead agency. The Foundation also awards grants under a program funded by the Agency for International Development (AID) to send American scientists and engineers abroad to participate in research, teaching and conferences in order to hasten the economic development of the host country. This is the Scientists and Engineers in Economic Development program (SEED).

One impetus for the Committee's decision to broaden the Foundation's activities and to urge that it exercise greater initiative in the development of new programs was the June 1975 National Academy of Sciences interim report, "Population and Food: Crucial Issues." One of the recommendations contained in the report suggested that:

To assist developing nations in achieving their goals, the developed nations should increase their support of efforts of the United States to stabilize populations and efforts already addressed to control and eradication of disease, to nutritional education and research, to research on human reproduction, and to development and dissemination of contraceptive materials and information.

In testimony before the Committee in March, 1976, Dr. Margaret Mead addressed the need for developing transnational, transcultural and transregional capacities noting:

We now have the experience to provide first class research and training in the international field, with reference to communication, technical interchange of all sorts, and the attainment of consensus in the area of international cooperation. . .

The Committee expects that the following activities will be emphasized by the Foundation pursuant to this Section of S. 3202:

- (1) providing support for U.S. scientists to work abroad in laboratories and research institutes dealing with these issues;
- (2) building the capacity of U.S. institutes to apply its scientific and technological developments to world agricultural problems;
- (3) increasing the effort within NSF to research agricultural and nutritional problems of cross-national and international concern;
- (4) increasing efforts in NSF's basic and applied research programs or relevant research in agriculture and nutrition;
- (5) assisting developing nations in utilizing non capital-intensive technology;
- (6) initiating international science policy studies addressed to these needs.

Dr. Eugene Skolnikoff also underscored the need for increased international scientific research, education and analysis in testimony before the Committee in October 1975 and through subsequent written suggestions to the Committee.

I would also recommend that there be explicit authorization for NSF to engage in a program of studies of international policy issues related to science and technology. The U.S. Government's present resources for international studies is woefully inadequate, and NSF in particular should be directly concerned at least with the international aspects of the subject areas which it supports.

* * * * *

the NSF should have a general concern for understanding the implications of science and technology and in particular the international implications for which no other agency has a clear mandate....

The Committee expects that programs included under this section of S. 3202, which will be conducted in all directorates of the Foundation, will be coordinated closely with the Office of Science and Technology Policy, the Department of State, the Agency for International Development, the Department of Commerce, and the Department of Agriculture.

The study of international scientific research, education and policy analysis, the results of which will be submitted to the House Committee on Science and Technology and the Senate Committee on Labor and Public Welfare by March 1, 1977, should be similarly coordinated and is expected to delineate further activities which will contribute to the amelioration of the agricultural and nutrition problems confronting the developing world.

2. INTERDISCIPLINARY RESEARCH

The Foundation's support programs for interdisciplinary research began in earnest in 1970 with the creation of the Office of Interdisciplinary Research. Funding for such research was accelerated with the formation of the RANN Program in 1971, when the Foundation consolidated its problem-oriented research activities. Interdisciplinary research is also supported in other Foundation programs, such as in the science policy and law and social sciences program in the Directorate for Biological, Behavioral, and Social Sciences.

The committee believes, however, that important opportunities remain for cross-fertilizing the knowledge and research approaches of major scientific disciplines. Interdisciplinary work combining the talents and skills of social scientists and technologists seems essential if the Nation is to meet adequately programs such as revitalization of our cities, untangling transportation bottlenecks, and enhancing energy conservation. The need for an interdisciplinary or multidisciplinary approach was underscored by Dr. Margaret Mead in testimony before this committee, March 1, 1976, in which she noted:

There is a need for greatly increasing transdisciplinary activities in broadly based undergraduate programs, in research projects which provide for apprenticeship training, in fellowship programs permitting career shifts, and arrangements for systematic higher and post-graduate degree training in more than one discipline. These are badly needed if we are to contribute to some of the most pressing problems of the modern world: hunger and malnutrition, urban crowding and disorganization, the degradation of the environment and proliferation of weaponry.

The committee instructs the Foundation to continue to encourage and promote interdisciplinary research and to explore opportunities to exploit multidisciplinary cooperation in existing support programs for research, education, and training. Periodic assessment of opportunities and barriers to such cooperation, including evaluation of academic reward incentives, facilities, management issues, and techniques also seems warranted.

3. SCIENCE FOR CITIZENS

S. 3202 directs the National Science Foundation to conduct a "Science for Citizens Program" designed to: (1) improve public understanding of public policy issues involving science and technology; (2) facilitate the participation of experienced scientists and engineers, as well as graduate and undergraduate students, in public activities aimed at the resolution of public policy issues having significant scientific and technical aspects; and (3) enable groups to acquire necessary technical expertise to assist them in dealing with the scientific and technical aspects of public policy issues.

The following excerpts from the hearing record address the importance and potential of this new program:

As technology grows both in its complexity and in its effects on our lives, it becomes increasingly important that the citizen have ready means of access to diverse sources of competent scientific information and advice. At the same time, however, the nation's reservoir of independent technical experts—"public interest scientists"—capable of providing such advice is not growing in proportion to the number and difficulty of the technological problems our society faces. The National Science Foundation's new Science for Citizens program can be seen as a response to this two-pronged problem.—Dr. Joel Primack, Author, *Advice and Dissent*.

... one of the real needs in this country is to provide a mechanism for encouraging more individual scientists and engineers to get into the action. I think the money spent by the Congress in this endeavor will certainly be money well spent. . . . In general I would say, in looking back over the history of federal involvement in research and development during this century, the prevailing tendency has been to spend far too little money, questioning the wisdom and long range effects of what we are doing in science and technology compared to the money spent in actually doing it. The Science For Citizens program is certainly a worthwhile attempt to try and redress this balance.—Dr. Alan Nixon, Past President of the American Chemical Society and current Past Chairman of the Committee of Scientific Society Presidents and current Chairman of the California Section of the American Chemical Society.

... except under extraordinary circumstances, citizen based organizations are essentially excluded from participation by the large volume and technical complexity of the issues involved. . . . The imbalance is extreme between how the average citizen influences decisions about new technology

and how the developers of the technology influence those decisions. The experiments begun to redress that imbalance have fallen short in resources and in relevance to citizen needs. The problem of relevance of the Science for Citizens Program is going to be a most crucial one and deserves special attention.—Dr. James B. Sullivan, Co-Director, Center for Science in the Public Interest; Research Director, National Council for Public Assessment of Technology.

Citizen understanding of science, and citizen participation in suggesting topics for research and needs for the application of science is of great importance. Citizen criticism of the attempts to apply science to human problems or ecological problems, is of the greatest importance also. But the presentation for citizenship review of raw material, undigested scientific results or research programs couched in technical scientific language with which only specialists are conversant is a mockery and an insult to the intelligence of laymen and laywomen. And it must be remembered that everyone—scientist, humanist, artist, technologist, politician—is lay to the specialty of each other citizen. The dichotomy of scientist and citizen is oversimplified and misleading. What is needed are social mechanisms through which the issues embedded in the reports of scientific commissions of inquiry and gigantic research projects may be organized so that they are intelligible to the lay public who can then participate in asking questions.”—Dr. Margaret Mead, Curator Emeritus of the American Museum of Natural History and Chairman of the Board of the American Association of the Advancement of Science.

In response to a question from Senator Kennedy on whether a program to enable scientists and engineers to make their services available to citizen groups might contribute to public understanding of science and improve the quality of debate on issues which have scientific components, Dr. Mead replied:

“I think this program needs a very careful examination, an examination in light of the experiments we have already made. You see, the Scientist’s Institute for Public Information has been experimenting for 20 years with getting groups of scientists to take complex things like atomic energy reports and digest them and simplify them so they could be presented to all sorts of citizen groups, and this is the kind of thing that needs to be done; we need some instrumentality of this sort.”

P.L. 94-86, the National Science Foundation Authorization Act of 1976, required the Foundation to prepare a comprehensive plan for the establishment and conduct of a Science for Citizens Program and to submit that plan to the Congress. The plan was submitted to the Committee in February of 1976 and its recommendations were based on seven public meetings in different regions of the country and thousands of pages of written testimony. The following program options were developed:

- (1) Registries of Scientists and Engineers
- (2) Media Programs to Increase Public Understanding
- (3) State-based Centers to Support Public Programs in Science and Technology

- (4) Scientists and Engineers Associates Program
- (5) Internship Program for Science and Engineering Undergraduate and Graduate Students
- (6) Establishment of a National Clearinghouse with Regional Branches
- (7) Establishment of Regional Centers
- (8) Forums, Conferences, and Workshops
- (9) Grants to Independent Journals

Also included was a report on the implications of the National Science Foundation assistance to nonprofit citizen organizations to assist them in acquiring the expertise to better deal with the scientific and technical aspects of public policy issues. The Conclusion of that report follows:

Congressional concern in broadening the opportunities for citizen participation in administrative decisionmaking is evidenced by the recent spate of environmental legislation, commencing with NEPA and including the landmark Clean Air and Federal Water Pollution Control Acts. In addition, Congress increasingly has passed statutes containing specific provisions encouraging citizen enforcement suits which allow for recovery of attorneys’ and experts’ fees.

Many Federal and state agencies have moved in the same direction. While few as yet are actually funding citizen inter-venor groups, many are establishing offices of public counsel and vastly improving their procedures for giving public notice and facilitating public comment. However, as pointed out by the National Water Quality Commission, the greatest barrier to effective citizen participation in complex proceedings is their lack of resources to pay for scientific and technical expertise to fully develop their commentary.

As Senator Kennedy said in introducing his most recent bill to cover expenses of citizen participation before Federal regulatory agencies:

“It is clear that removing barriers and opening processes are not enough. If we are really to bring the unrepresented public directly and fully into the governmental processes, we must provide for the Government to shoulder part of the cost.”

The Science for Citizens program could be a good beginning toward that goal.

At the same time the Committee recognizes that there are a number of drawbacks to providing direct assistance to citizen groups. The Boasberg Report is particularly enlightening in this regard. (The report was prepared by the law firm of Boasberg, Hewes, Finkelstein and Klores and referred to as the Boasberg Report). The Report found that NSF lacks experience in the area of citizen participation. That condition might lead to undesirable “tensions between NSF and the functional agency in whose administrative proceedings the groups will be participating.” As Senator Laxalt noted, “the further politicization of the NSF could work to the detriment of its other vital functions”.

In its budget presentation to the Congress, the Foundation requested \$300,000 to continue development of the Science for Citizens Program and to conduct "trial runs" of several of the alternatives. The Committee notes that this budget was prepared by the Foundation and the Office of Management and Budget before the Science for Citizens Program Plan was completed. As a result the recommendations included in the plan were not fully considered prior to the submission of the fiscal year 1977 budget request to the Congress.

The Committee has reviewed the Plan carefully and has recommended \$3,000,000 for the Science for Citizens Program including an augmented Public Understanding of Science Program. The Committee recommends that consideration be given to providing support for—

- (1) qualified scientists and engineers to work on public policy issues with significant scientific and technical components in conjunction with groups which serve important public purposes, units of State and local government, or nonprofit media organizations;
- (2) internship programs for science and engineering undergraduate or graduate students to work on public policy issues with significant scientific and technical components in conjunction with groups which serve important public purposes, units of State and local government, or nonprofit media organizations, as part of their academic training;
- (3) forums, conferences, and workshops on public policy issues with significant scientific and technical components;
- (4) new and existing independent journals for the publication of research and for commissioning or publishing reports or papers generated by public interest activities to be circulated among scientists and engineers, and among the public in a form understandable by the general public;
- (5) new and existing media programs utilizing radio or television to increase public understanding of public policy issues with significant scientific and technical components;
- (6) groups which serve important public purposes to acquire necessary technical expertise relating to the scientific and technical aspects of public policy issues and to enable such groups to bring together in appropriate forums experts whose research has been directed to the resolution of such issues; and
- (7) travel and related expenses incurred by scientists, engineers, or members of groups which serve important public purposes to facilitate the exchange of information regarding the scientific and technical components of public policy issues.

The Committee recommends that planning grants be made available for the following activities:

- (1) the design and use of registries of scientists and engineers to serve as a resource to local decisionmakers, community and citizens groups, including the study of past and present registries and their effectiveness;
- (2) the establishment of at least one regional center to support projects involving public policy issues with significant scientific and technical components, which have been proposed by State and local organizations and institutions; and
- (3) the establishment of a national clearinghouse with at least one regional branch to facilitate access by scientists, engineers and

the general public to research and other information and material related to the scientific and technical components of public policy issues.

S. 3202 requires that the membership of each review panel established to evaluate applications for awards and planning grants under the Science for Citizens Program be balanced as to representation of the scientific and nonscientific community and the public and private sectors. Witnesses testified repeatedly that in order to ensure the leverage of the Program and its relevance it is essential that citizen groups participate in design the program and play a *significant* role in determining the forms that assistance should take. The Committee fully endorses this view, and expects that each panel which reviews proposals submitted for funding under the Science for Citizens Program will include scientists, representatives of citizen groups, representatives of minority groups, representatives of women's groups, representatives of groups which serve important public purposes and nonscientists.

In addition the Committee strongly urges the Foundation to appoint an Advisory Committee for the Science for Citizens Program to participate in the development, planning and implementation of the Program. The Committee recommends that the Advisory Committee consist of fifteen members, not less than eight of whom are representative of citizen groups, groups which serve important public purposes, minority groups, and women's groups, and not less than three of whom are non-scientists.

4. CONTINUING EDUCATION IN SCIENCE AND ENGINEERING

The need for continuing education in science and engineering has been of concern to the Committee since 1971 when S. 32, the Convention Research and Education Act, was introduced providing for retraining and re-education of scientists and engineers. This sustained interest in continuing education for scientists and engineers reflects the Committee's recognition of these professionals as a national resource.

As Senator Kennedy noted to the Committee in 1971 conversion hearings:

Since each working scientist or engineer generates 6 to 10 other jobs, this (unemployment of scientists and engineers) means a potential loss of jobs throughout the Nation. And it means that it will take us that much longer before we can bring out social problems under control.

At the same time, Ms. Betty Vetter, Executive Director of the Scientific Manpower Commission commented to the Committee:

It is unrealistic to expect that the United States can maintain technological superiority or even parity if those persons whom we encourage to prepare themselves to meet a particular federal technological needs, such as the space program, cannot look forward to going on to new problems when those are solved. Thus a policy which recognizes continued technological effort at the federal level offers to the prospective scientist the potential assurance that his services not only will be needed but will be in demand to carry out the Nation's objectives.

Although the unemployment levels that originally inspired that legislation have abated during the past 5 years, the Committee recognizes that unemployment and underemployment among scientists and engineers continues at a time when the Nation is facing pressing problems in areas of civilian science and technology. There is significant potential in the skills of unemployed and underemployed scientists and engineers that must be applied to the solution of the Nation's problems.

As an initial step, S. 3202 directs the Foundation to begin a program of continuing education in science and engineering for professionals engaged in their careers for at least 5 years to upgrade their skills and to apply their talents more fully. \$1 million is authorized for this program, and it is expected that its primary focus will be the underemployed. The Nation has already made a substantial investment in educating scientists and engineers and cannot now afford to waste it through underutilization. The funds would be available for grants and fellowships and for the development of special curricula and education techniques to complement the Foundation's existing program designed to provide career scientists and engineers with the up-to-date information they need to function effectively.

The Committee also expects that the activities of the Foundation in carrying out its mandate under the National Science and Technology Policy, Organization, and Priorities Act of 1976, which include the gathering and analysis of information on the employment and availability of scientific, engineering and technical manpower will serve to delineate future directions for the program. The Committee feels that the Foundation is the logical focus for such a program since science education is one of its most important responsibilities.

The need for continuing education for scientists and engineers was recently underscored in a communication from the AFL-CIO to the Committee concerning the provisions of S. 3202:

It is an inherent characteristic of science and engineering that new knowledge is constantly being developed necessitating life-long study on the part of their practitioners.

* * * * *

In many cases, the employment problems of scientists and engineers result directly from governmental decisions that are beyond their control * * * These may not match the background of available people. Re-training is required.

Thus, the Committee believes that it is to the benefit of the Nation, and to the maintenance of its scientific and technological capabilities, that there be continuing education for its scientists and engineers.

5. MINORITIES, WOMEN, AND HANDICAPPED INDIVIDUALS

The underrepresentation of minorities, women, and handicapped individuals, in science and engineering is of grave concern to the Committee.

Women comprised only 5 percent of the persons employed in science and engineering occupations in 1974, and were primarily involved in psychology, social sciences, and mathematics; in the academic sector, women represented just 15% of all scientists and engineers employed

full-time in 1974. In fact, the proportion of women with doctorates was higher in 1920 than it has been in any decade since.

Minorities comprise only 4 percent of the national pool of scientists and engineers. In 1973, minorities represented only 2.6% of all graduate students enrolled in the fields of science and engineering. For example, the total number of Ph.D's awarded to blacks in engineering and the sciences in the 13-year period from 1958 to 1971 was just 924. This represents only 0.8% of the total number of doctorates awarded in these fields during this period. While there were 46 engineers and 27 scientists per 10,000 population in the United States in 1972, there was less than one engineer or scientist per 10,000 Hispanics. Hispanic-Americans hold only 30 Ph.D's in chemistry of a total of about 25,000; only 10 Ph.D's in physics out of about 15,000; only 10 Ph.D's in mathematics out of 14,000; and about 40 Ph.D's in the life sciences out of 50,000.

Problems related to science and the handicapped also exist at many levels. Although no comprehensive data exists on the number of handicapped scientists in the United States, over 500 have identified themselves to the American Association for the Advancement of Science. Based on letters, questionnaires and direct contact with these scientists it appears that a large number of handicapped scientists have been identified as underemployed and holding jobs much below their level of competency and training. A smaller number is identified as unemployed though the data on this group may not be an accurate reflection of the situation, as an intensive effort to locate these individuals has not yet been made. Equal concern exists over the disabled who, despite interest, attitude and ability, never became part of the potential pool of scientists and engineers.

Science education is perceived as the domain of the National Science Foundation, and as a result science education for the handicapped has traditionally been largely overlooked by those agencies specifically charged with the education of the handicapped. The Committee urges the Foundation to focus on this problem and to expand the options for science education and careers for capable, interested, physically disabled youths. The Foundation can play a major role in bringing handicapped scientists into the mainstream of science, improving their status and increasing their visibility. By including these individuals in all aspects of NSF activity this valuable resource can be utilized in furthering the advancement of science and technology in the U.S. The perspective of these individuals, different because of the adjustments they have had to make, must not be lost, nor must their physical disabilities be allowed to overshadow their scientific capabilities.

The under-representation which the Committee has identified indicates that the nation is overlooking the potential contributions which women, minorities and the handicapped can make in scientific and technological education and development. S. 3202 includes the following provisions to address this need:

(a) The Foundation is directed to initiate an intensive search for qualified women, minorities and handicapped individuals to fill executive level positions at the Foundation. In this effort, the Director is to work closely with organizations which have been active in seeking greater recognition and use of the scientific and technical capabilities of these groups. The Director is also required to improve the repre-

sentation of minorities, women and handicapped individuals on advisory committees, review panels and all other means by which the scientific community provides assistance to the Foundation. The Committee stresses that this participation must extend across the entire spectrum of NSF programs, and should not be limited to particular program areas where the needs of these groups receive special emphasis.

The Committee expects that the quarterly reports required by this subsection will be included as part of the Foundation's regular quarterly reporting to the Congress.

(b) S. 3202 earmarks \$5,000,000 for the continuation of the program "Minority Institutions Improvement", which has provided support to approximately 200 colleges and universities whose enrollment is predominantly Black, Native-American or Spanish-speaking. The Committee fully endorses its objective of this program to increase the flow of underrepresented minorities into scientific careers through the development of new science curricula, instructional strategies, and educational procedures; to upgrade instructional facilities through the purchase of laboratory or teaching equipment; to improve faculty competence; and to increase the effectiveness of related institutional procedures.

S. 3202 also earmarks \$2,500,000 for "Minorities, Women, and Handicapped Individuals in Science" for experimental forums, conferences, workshops and other activities designed to improve scientific literacy and to encourage and assist minorities, women, and handicapped individuals to undertake and to advance in careers in scientific research and science education. The Committee expects that \$1 million will be available for minorities, \$1 million will be available for women, and \$500,000 will be available for the handicapped, and strongly urges that this program be included in future budgets until the time when representation of minorities, women, and the handicapped in science and engineering approaches their representation in the population as a whole.

(c) S. 3202 establishes a program to provide planning grants to determine the need for and feasibility of developing Minority Centers for Graduate Education in Science and Engineering. This new program will expand the options of the minority community in science and engineering. The Foundation is also encouraged to examine other means to facilitate the entry of minority students into the mainstream of science and science education. The Centers are to serve as a place where minority students may choose to complete their educations, thus allowing these students to obtain their undergraduate degrees at the colleges and universities near them. The Centers will provide an additional option for minority faculty, who now frequently must choose between the pursuit of an academic research career and the education of their fellow minority members. The Program will go beyond the Minority Institutions Improvement Program, by providing opportunities for research in universities with graduate students, and post-doctoral associates.

The Centers will also create options for small minority colleges and community colleges. These colleges would be able to design programs for their students so that the academic year could be used for basic courses, while the summers would be devoted to advanced courses in the students' chosen field at one of the Centers. The faculty of these

colleges might be employed for the summer at the Centers where they would teach advanced courses.

The Centers would create options for the minority community by providing exposure to the latest and most sophisticated science and technology. Since it is likely that the faculty at these centers would live in the minority community, they would be a source of highly trained scientists and engineers for the local schools. Faculty members would serve as role models for aspiring young minority students.

The Committee was most impressed with the evidence that was presented on the record and achievements of minority institutions and their effectiveness in preparing minority students for professional careers. The majority of black professional graduates for example, attend black institutions some time during their academic tenure. This is a compelling example of how black faculty at these institutions serve as role models in inspiring students to obtain advanced degrees.

The Committee does not intend that institutions to be eligible for support must have 50% or more minority enrollment. Rather, it intends that any institution which can demonstrate a sizable minority student enrollment, especially in the case of large universities, will be eligible to participate in the program, provided that the other criteria outlined in Section 205 (c) (2) are met.

Letters of support for the Minority Centers Program have come to the Committee for institutions and educators from across the country. A partial listing follows:

David A. Sanchez, Associate Professor, Department of Mathematics, University of California; Los Angeles, California
 L. Gabriel Navar, Associate Professor, The Medical Center, Physiology and Biophysics, University of Alabama; Birmingham, Alabama
 Juan Gomez-Quinones, Director Chicano Studies Center, University of California; Los Angeles, California
 Elma Gonzalez, Assistant Professor, Department of Biology, University of California; Los Angeles, California
 Cecilia Preciado-Burciaga, Assistant to the President and Provost for Chicano Affairs, Stanford University; Stanford, California
 Paul Ortiz de Montellano, Assistant Professor of Chemistry and Pharmaceutical Chemistry; School of Pharmacy, Department of Pharmaceutical Chemistry; University of California, San Francisco, California
 Richard Tapia, Visiting Associate Professor, Department of Operations Research; Stanford University
 Robert F. Flakes, Jr., Director, Center for the Improvement of Minority Participation in Science (CIMPIS), Chairman, Department of Chemistry, College of Science and Technology; Florida Agricultural and Mechanical University; Tallahassee, Florida
 Robert Treatt, President, Morris Brown College; Atlanta, Georgia
 Hugh M. Gloster, President; Morehouse College; Atlanta, Georgia
 Charles L. Knight, Acting President, Park College; Atlanta, Georgia
 Thomas D. Jarrett, President, Atlanta University; Atlanta, Georgia
 Thomas W. Cole, Jr., Professor and Chairman, Department of Chemistry, Atlanta University; Atlanta, Georgia
 Albert E. Manley, President, Spelman College; Atlanta, Georgia
 Lisle C. Carter, Jr., Chancellor, Atlanta University Center; Atlanta, Georgia

Manuel P. Berriozabal, Professor of Mathematics, University of New Orleans; New Orleans, Louisiana
 Press L. Robinson, Democratic State Central Committeeman and Professor of Chemistry, Department of Chemistry; Southern University; Baton Rouge, Louisiana
 James H. Porter, Associate Professor of Chemical Engineering, Massachusetts Institute of Technology, Department of Chemical Engineering; Cambridge, Massachusetts
 Antonio A. Sandoval, Professor, Department of Chemistry, College of Arts and Sciences, University of Missouri; Kansas City, Missouri
 William E. Davis, President, The University of New Mexico; Albuquerque, New Mexico
 Leonard M. Napolitano, Dean, School of Medicine, Interim Vice President for Health Sciences, The University of New Mexico; Albuquerque, New Mexico
 Gilbert Sanchez, Head, Biology Department, New Mexico Institute of Mining and Technology; Socorro, New Mexico
 Betty W. Harris, Los Alamos, New Mexico
 Samuel von Winbush, Professor and Chairman of Department of Chemistry, College at Old Westbury, State University of New York; Long Island, New York
 Hubert M. Winston, Assistant Professor, Department of Chemical Engineering, School of Engineering, North Carolina State University; Raleigh, North Carolina
 Thomas Davis, Bartlesville, Oklahoma
 Milton J. Hernandez, Assistant Professor of Medicine and Physiology, Department of Medicine/Neurology Division, The Milton S. Hershey Medical Center, The Pennsylvania State University; Hershey, Pennsylvania
 Ernest D. Marquez, Assistant Professor, Department of Microbiology, College of Medicine, The Milton S. Hershey Medical Center, The Pennsylvania State University; Hershey, Pennsylvania
 Eppie Rael, Assistant Professor, Department of Biology, University of Texas; El Paso, Texas
 Rodney R. Rodriguez, Graduate Student, University of California at Berkeley, Department of Physiology-Anatomy, El Paso, Texas
 William A. Guillory, Chairman/President, National Organization for the Professional Advancement of Black Chemists and Chemical Engineers, University of Utah; Salt Lake City, Utah
 Manuel Gonzales, LULAC National President, League of United Latin American Citizens; Washington, D.C.
 M. Carl Holman, President, The National Urban Coalition, Washington, D.C.
 Eduardo Terrones, Chairman, American G I Forum of Washington, D.C.
 Ernest G. Uribe, Associate Professor of Botany and Biochemistry, Washington State University; Pullman, Washington
 James E. Cheek, President, Howard University; Washington, D.C.
 Glenn Terrell, President, Washington State University, Pullman, Washington
 Bernard Ortiz de Montellano, Coordinator, Minority Academic Affairs, College of Arts and Sciences, The University of Wyoming; Laramie, Wyoming

Estus Smith, Vice President for Academic Affairs, Jackson State University; Jackson, Mississippi

In the development of the criteria for the award of planning grants for Minority Centers, S. 3202 directs the Foundation to work closely with groups which have been active in seeking greater recognition of the scientific and technical capabilities of minorities. The Committee also expects that the peer review panels established to consider applications for planning grants will include significant representation of minority scientists and educators.

Recognizing the care and thoughtful planning which must go into this new program if it is to be effective and the importance of the report which will be presented to the Congress on the results of the planning grants, the Committee strongly urges the Director of the Foundation to appoint a National Advisory Board to participate in the development and implementation of these activities. At least two-thirds of the members of the Advisory Board should be minority scientists.

S. 3202 also requires the Foundation to report to the authorizing Committees on Activities pursuant to this subsection not later than March 1, 1977.

6. OFFICE OF SMALL BUSINESS RESEARCH AND DEVELOPMENT

The National Science Foundation Act of 1950 establishes as an objective of the Foundation "to strengthen research and education in the sciences, *including independent research by individuals*, throughout the United States, and to *avoid undue concentration* of such research and education" (italics added). At no point in the Act is the Foundation prohibited from funding profitmaking research institutions, such as industrial laboratories or individual inventors and entrepreneurs. However, in practice it has largely refrained from doing so. Recently, this practice has begun to show some changes, however, particularly within the RANN Directorate, and primarily in response to Congressional direction. S. 3202 for example, calls for a 10% small business set-aside of RANN funds, and a preliminary study of the effects of broadening the funding pattern of the Foundation is requested elsewhere in this Report.

As a result of these changes, and conscious of the National Science Foundation's mandate to "appraise the impact of research upon industrial development and upon the general welfare", S. 3202 directs the Foundation to establish within the Office of Government and Public Programs an Office of Small Business Research and Development, the functions of which will be to:

- (1) foster communication between the Foundation and the small business community; and oversee the administration of small business set asides to ensure their effective utilization;
- (2) publish information on the grants awarded to small business by the Foundation, and the procedures adopted by the Foundation for handling small business proposals;
- (3) assist small businesses in their dealings with the Foundation;
- (4) recommend whatever changes in Foundation procedures it may see fit in order to draw fully on the resources of the small business research and development community;
- (5) submit quarterly reports to the Congress.

The Foundation is also directed, in collaboration with the Small Business Administration and private sector organizations representing small business, to prepare a comprehensive report on the scientific and technical capability which exists in the small business community.

The Committee expects the Office of Small Business Research and Development to serve as an effective nerve center within the Foundation for the coordination and implementation of Foundation policies and procedures as they apply to small research and development firms. The Committee feels strongly that these companies constitute in the aggregate a valuable national resource which is not being fully utilized at present. The Foundation can and should play an important role in helping this sector of the economy realize its full potential.

The Committee carefully considered its decision to place the Office of Small Business Research and Development within the Office of Government and Public Programs, rather than within a particular Research Directorate. The full extent and nature of small business involvement with the Foundation over the next few years cannot be predicted at this time and for this reason the Committee feels that the Office must have a position within the organizational structure of the Foundation which will give it a broad overview of the full range of Foundation activities.

The Committee expects that the quarterly reports required by this section will be included as part of the Foundation's regular quarterly reporting to the Congress.

7. STATE SCIENCE, ENGINEERING, AND TECHNOLOGY PROGRAMS

In the 93rd and 94th Congresses, the Senate passed, as part of S. 32, provisions to authorize funding in order to strengthen mechanisms for providing scientific advice to State governments. The Senate in passing this legislation recognized the need of the States to further develop their capacities to respond in an informed manner to the increasingly technical issues with which they are daily confronted.

In the conference on H.R. 10230 (S. 32), the National Science and Technology Policy, Organization, and Priorities Act of 1976, the Conferees strongly endorsed the need for such a program, but determined that the National Science Foundation authorization legislation was perhaps a more appropriate vehicle through which to institute this program. The Statement of Managers filed with the Conference Report on H.R. 10230 (S. 32) stated:

At the same time the Conferees agreed to express their unanimous conviction (1) of the soundness of the concept that State and local governments would profit from their own science advisory system; (2) that such systems could be made more effective through appropriate liaison with the Federal Government; and (3) that greater cooperation and improved financial arrangements between the States and localities in the National Science Foundation are in order, including adequate additional financial support of programs designed to increase the States' capacity for wise application of science and technology for State and local needs.

In order to provide adequate funding to undertake such programs, S. 3202 authorizes grants (not to exceed \$200,000) to any State, to pay a part of the cost of establishing or strengthening science, engineering and technology advisory offices within the Executive and Legislative branches of the State government. Individual proposals from either branch of State government, could be funded at levels up to \$100,000 each, and all such funding would be on an 80/20 Federal/State matching basis. Each State would also be required to state its intention of assuming the full cost of any such office two years after receiving any such grant. This program has gained the widespread support of State and local government organizations, including the National Governors' Conference, the United States Conference of Mayors, the Federation of Rocky Mountain States, and the National Conference of State Legislatures.

8. ADVISORY COUNCIL TO THE NATIONAL SCIENCE FOUNDATION

The Committee welcomes the decision of the Foundation to establish an Advisory Council "to provide advice and counsel to the NSF Director and principal members of his staff on Foundation wide issues which require the expertise of the many and varied disciplines and program interests represented in the Foundation."

To ensure that the Council fulfills its purpose and that does not duplicate the policy and advisory responsibilities of the National Science Board S. 3202 requires that the Council, to be composed of twenty-four members, must include at least six individuals who are not scientists. S. 3202 further requires that the Council must furnish advice to the Board and the Director on broad policy matters relating to the activities of the Foundation, particularly science research and education policy, and that it must promote public understanding and access to information concerning the activities of the Foundation. The Committee recommends that the Advisory Council meet at least four times a year, in order to promote its ability to advise and make recommendations concerning ongoing and developing programs and activities.

The Committee endorses the Foundation's interest, as stated in the report "Public Participation—Findings and Plans" submitted in December of 1975, in obtaining "the views and interests of nonscience groups through a varied and extensive program of meetings and conferences" and urges the active pursuit of these activities in addition to the establishment of the Advisory Council.

With regard to the conclusion of the Public Participation Report that "the majority of the Foundation's future policies and activities will consist of a continuing development of the very substantial body of techniques and practices which has been built up over the years" the Committee wishes to stress that while these techniques and practices have proved effective in providing continuing contact between the Foundation and outside scientists, they have not been as successful in establishing a similar relationship between the Foundation and non-scientists. It is to this need which the Committee urges the Foundation to assign high priority in the effort to improve public participation.

TITLE III—NATIONAL SCIENCE AND TECHNOLOGY POLICY

AMENDMENTS TO THE NATIONAL SCIENCE FOUNDATION ACT OF
1950, AS AMENDED

S. 3202 includes amendments to the National Science Foundation Act of 1950 as amended which relate to the fundamental mission of the Foundation, and to the mission, composition, and staffing of the National Science Board. Most of these provisions were in S. 32 of the 93rd Congress, the National Policy and Priorities for Science and Technology Act of 1975, which the Senate approved October 11, 1974. During consideration of S. 32 in the present Congress, the Committee decided that these amendments more properly belong in the NSF authorization, since they focus on the National Science Foundation, rather than in the recently enacted National Science and Technology Policy, Organization, and Priorities Act of 1976, whose focus is the Executive Office of the President.

(1) National Science Foundation

Section 3(d) of the Foundation's organic act is amended to reflect that its present responsibility includes the development of national policies to foster *both* basic and applied research and education both in the sciences, as heretofore, and also in the important field of engineering. Furthermore, the Foundation's obligation to recommend policies designed to support the application of scientific and technical knowledge to the solution of both national and international problems is enunciated.

The broadening of the Foundation's mission to include international problems strengthens the Foundation's authority to undertake activities such as the study of international scientific research, education, and policy analysis which the Foundation is directed to conduct in section 201(b) of S. 3202.

(2) National Science Board—Function, Membership, Reporting, and Staff Support

Section 4(a) of the National Science Foundation Act of 1950, as amended, is modified to assure that the policies which the National Science Board establishes for the National Science Foundation are "within the framework of applicable national policies as set forth by the President and the Congress." This addition establishes essential coordination between policies which the Board may set for the Foundation and those enumerated in Title I of the National Science and Technology Policy, Organization, and Priorities Act of 1976. With the recent approval of this Act, the Nation for the first time in its history has a comprehensive statement of national policy for science and technology, linked to enumerated priority goals, and including defined principles, and implementation responsibilities and procedures.

Changes are made in section 4(c) of the Foundation's organic act to assure representation on the National Science Board from industry. Furthermore, members of the Board are to be selected so as to provide a representation from a diversity of fields and differing points of view. The Act is further amended to include certain new scientific and educational organizations as sources of recommendations for nominations to the Board (National Academy of Engineering, Sea Grant Associa-

tion, American Association of Community and Junior Colleges, and organizations which focus on the interests of minorities, women, and the handicapped in science.)

All of these changes are necessary if the Board is to keep pace with its responsibilities under the broadened mission of the National Science Foundation, which requires that the interests of all scientific fields, all levels of academic institutions, and all citizens be represented.

The Foundation's organic act is amended in two other respects in relation to the National Science Board.

As amended, section 4(g) requires the Board to report annually by January 31 to the President and the Congress on the "status and health of science and its various disciplines." A previous requirement that the Board prepare an annual report was eliminated by section 503 of the National Science and Technology Policy, Organization, and Priorities Act of 1976. The Committee is reinstating a requirement for an annual report by the National Science Board, but is leaving the Board free to use its discretion concerning the structure of such a report.

Section 4(h) which provides the authority for a five member staff for the National Science Board is amended to require that appointments of such staff by the Director of the Foundation shall be made after consultation with the Chairman of the Board. A further amendment raises the maximum grade level for staff for the Board to the equivalent of the top grade in the classified service (GS-18). The Committee is concerned that this staffing authority has not been used, particularly in view of the increased responsibilities of the Board as the policymaking arm of the Foundation. The \$800 million budget for which it is responsible requires that it be supported by the best scientific and technical assistance obtainable within the Federal Government. The scaling upward of the grade level at which staff can be compensated is a partial attempt to address this very real need, and is expected by the Committee to result in the early appointment of staff members to serve the Board.

(3) Assistance to the Office of Science and Technology Policy

The Office of Science and Technology Policy being established within the Executive Office of the President is expected to be a small office. If it is to discharge its broad responsibilities under the National Science and Technology Policy, Organization, and Priorities Act of 1976, the Office will have to use the manpower and funding data base which the Foundation has assembled, as well as assistance in the form of additional information sources and staff from the National Science Foundation. Section 303 of S. 3202 authorizes the Foundation to provide these services.

D. TITLE IV—GENERAL PROVISIONS

1. FOREIGN EXPENDITURES LIMITATION

S. 3202 authorizes \$6 million for expenses incurred outside the United States to be financed from foreign currencies which the Treasury Department determines to be in excess of the normal requirements of the United States.

2. CONSULTATION AND EXTRAORDINARY EXPENSE LIMITATIONS

S. 3202 provides \$5,000 for use by the Director of the Foundation at his discretion. These funds may be used for official consultation, representation and other extraordinary expenses.

3. OBLIGATION LIMITATION

S. 3202 provides that appropriations made pursuant to the Act shall remain available for obligation and expenditure for the period of time specified in Acts making such appropriations.

4. INFORMATION REQUIREMENT

S. 3202 requires the Director of the Foundation to keep the House Science and Technology Committee and the Senate Labor and Public Welfare Committee full and currently informed on all activities of the Foundation.

IV. Committee Views

FEDERAL INVESTMENT IN BASIC RESEARCH

The Administration's request for the overall National Science Foundation budget shows an increase of 11% over the FY 76 figure. Of this, the amount budgeted specifically for the support of basic research has been increased by 19.5%. In constant 1972 dollars, these increases are 5.8% and 12.6%, respectively.

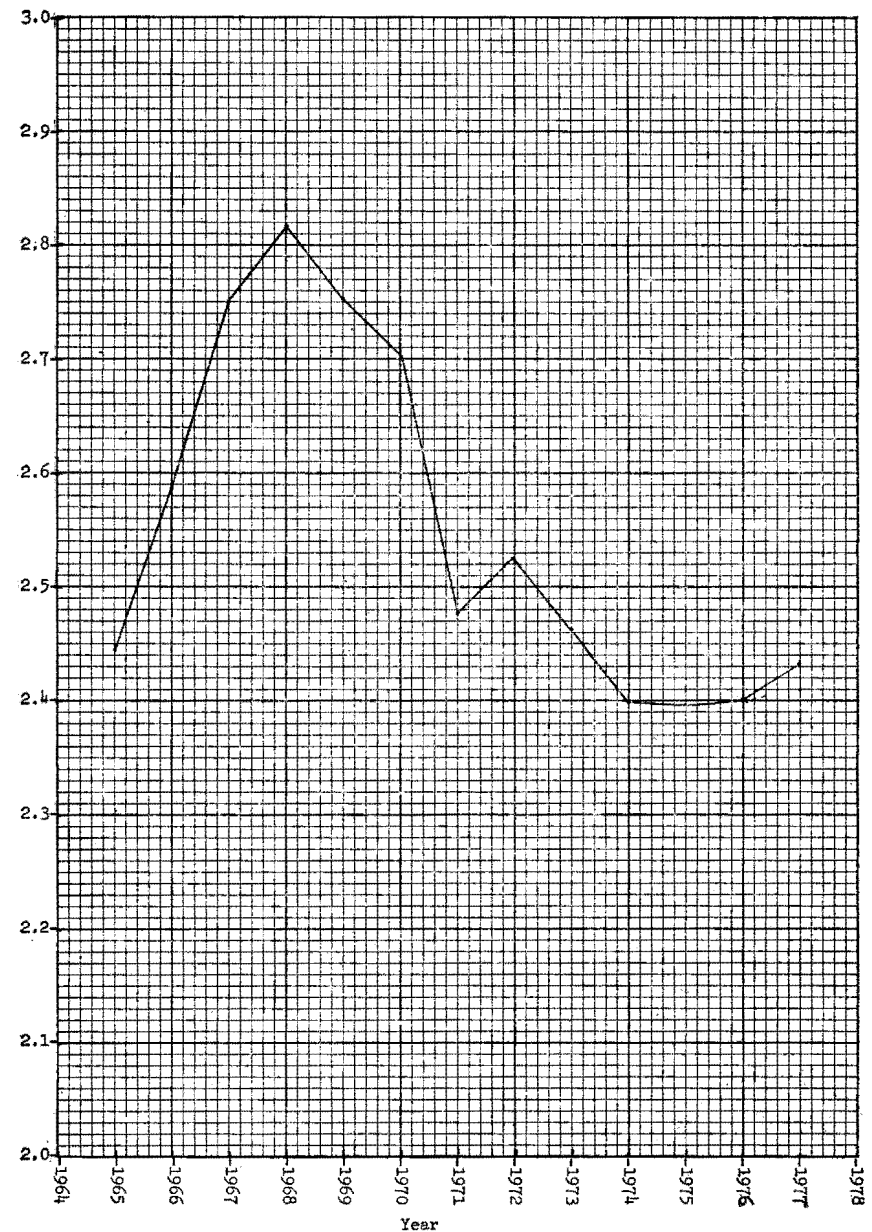
The Committee points out that the long term trend in Federal funding of basic research over the past decade has been steadily downward. It is disturbed to note, moreover, that the increase in the National Science Foundation budget has not been matched by corresponding increments at the other research supporting agencies. The Department of Health Education and Welfare, for example, when proper account is taken of a \$71 million supplemental appropriation to the FY 76 budget, actually suffers a decrease, in constant dollars, of 9% in its support of basic research. The net result is that the Administration request for the overall support of basic research represents, in constant dollars, a net increase of only 1%.

The long term trend in Federal support of basic research is displayed in the accompanying graph. The most striking feature is clearly the precipitous decline in funding from a high point in 1968. The Committee notes that the increase proposed by the Administration does not even return the level of support to that of 1965.

In the light of these statistics, the Committee strongly supports the Administration budget for support of basic research at the Foundation. The Committee hopes and expects that this increase will be approved by the Congress without significant reductions.

[The graph referred to follows:]

FEDERAL BASIC RESEARCH EXPENDITURES (CONSTANT DOLLARS)
(In billions of dollars)



FUTURE PATTERNS FOR NATIONAL SCIENCE FOUNDATION SUPPORT FOR
BASIC AND APPLIED RESEARCH

The Administration request for basic research programs in FY 77 represents a 19.5% increase over FY 76, reflecting an awareness of the important role which such research must play in furthering the Nation's economic and social goals. The Committee concurs with the Administration proposal, and has approved the increase requested.

The Committee feels that there are two distinct justifications for the public funding of research in the sciences. One is that such work should be supported on the general principle that knowledge is better than ignorance. An example of how such knowledge, fundamentally motivated by simple curiosity, may be of benefit to the society is provided by the recent discovery of a possible link between terrestrial uses of the gas Freon, and the depletion of ozone in the stratosphere.

The second justification for the support of basic research is that such research ultimately may be applied in the marketplace, or in the solution of social problems, and result in new goods or services of benefit to the taxpayer. This innovative process, which involves the transformation of science into technology, has not traditionally received much attention, and in the past seems to have relied rather heavily on serendipity for success.

The Committee notes with concern the recent accumulation of evidence that the Nation is apparently falling behind the rest of the world in technological innovation. According to the report "Science Indicators 1974", published by the National Science Foundation, the U.S. has shown a sharp decline in its "balance of patents" with other technological countries over the past several years. Of even greater concern, perhaps, is the long term decline of the proportion of innovations which were characterized as "radical breakthroughs", which was attributed to reductions in the number of such innovations from the most R&D-intensive industries. The Department of Commerce has pointed out recently that the percentage of foreign patents taken out in a number of technologically innovative fields is alarmingly high.

The same National Science Foundation Report also points up another long term trend which is of concern to the Committee. This is the recent lack of growth in science departments at the Nation's colleges and universities. Having experienced an explosive growth rate during the Sixties, these departments now typically consist of relatively young faculties, with high teacher-student ratios, and almost no prospect for expansion. Not surprisingly, the fraction of the faculty members holding tenure in these science departments has also been steadily increasing, reaching 70% by 1974. This means that the pattern of the Sixties, in which recent science graduates turned naturally to academic careers, has shifted markedly, and the younger scientists are no longer making careers at universities. Accurate statistics describing this demographic shift appear to be lacking, but it seems likely that many recent science graduates are moving to industrial positions, and that this is a trend which is likely to continue.

If this is so, it may provide significant impetus toward solving the problem of technological innovation described above. For if the recent graduates in science are indeed pursuing careers in industry, then—to the extent that they are employed in research and development—they

may serve as catalysts to increase the useful application of science and technology in the society.

However, there are important economic barriers which may impede progress toward the twin goals of full productive employment and closer coupling of science and technology. Innovative, farseeing research rarely pays for itself in profits to the company sponsoring. Therefore, industrially funded research tends to be directed at making well defined, incremental changes in existing technology, rather than exploring the possibilities for radical breakthroughs. The latter are too unlikely and take too long to realize commercially when they do occur, for such a course to be considered cost effective. This is particularly true during inflationary periods.

The question, therefore, arises as to the proper role for the Federal government in general, and the National Science Foundation in particular, to play under these circumstances. The Committee requests the National Science Foundation to initiate a study of this set of problems, and to report its findings and recommendations to the Committee not later than December 31, 1976. The study should include, but not be limited, to the following elements:

(1) A description of current Foundation policy regarding the funding of research in other than educational institutions, and a brief review of how that policy has evolved over the years.

(2) A survey of the available data on the extent of scientific and technical resources in other than educational institutions.

(3) A description of anticipated problems and benefits of a policy which would broaden the funding patterns of the Foundation to include more support of nonacademic institutions, together with recommendations for changes, if any, in the present funding policy.

The Committee recognizes the importance of a careful examination of any proposed change in the funding policy of the Foundation. However, in the light of the very serious concerns expressed above, the Committee feels the time has come to initiate discussion of the long range options open to the Foundation in a rapidly changing situation, and it hopes that the proposed study will prove a useful first step in that discussion.

MANAGEMENT AND UTILIZATION OF SCIENTIFIC AND TECHNICAL
INFORMATION

The Committee has devoted considerable attention to the extent and implications of the rapid growth of scientific and technical information. It views scientific and technical information as a major national resource and recognizes that the nation must plan, conserve and manage its utilization.

Information must be viewed as both the raw material and the end product of all research. Each experiment draws on existing information, and through its results, creates new information to add to the nation's storehouse of knowledge. Studies have shown that the average scientist spends over half his time in various forms of communication.

This has led to the publication of over 30,000 journals, with over one million scientific papers each year. To help scientists digest this vast outpouring of information, there are over 300 abstract journals

and over 400 specialized information centers. But even with these aids few, if any, scientists, can keep up with all of the new research relevant to their work.

It is the view of the Committee that this nation can greatly increase the value of its research and development effort through better management of scientific and technical information. If scientists are kept better informed of relevant research results, they can avoid unnecessary duplication and sometimes find significant breakthroughs in their work. If engineers are aware of relevant research findings, they can put those results to work in practical applications. And in the management of science, new techniques, like the citation index, can be used to supplement established methods of evaluation such as the peer review system.

The Committee wishes to emphasize the importance to the management and utilization of scientific and technical information of the National Science and Technology Policy, Organization, and Priorities Act of 1976 developed by this Committee and signed into law by the President on May 11, 1976. The preamble of that Act highlights "information handling". "Information dissemination" is identified as one of the areas from which the members of the President's Advisory Committee on Science and Technology are to be drawn. The President's Advisory Committee is given the task of conducting a comprehensive survey, including consideration of "improvements in existing systems for handling scientific and technical information on a government-wide basis, with consideration of the appropriate role to be played by the private sector." The Act establishes as a national policy that, "it is the responsibility of the federal government to promote prompt, effective, reliable, and systematic transfer of scientific and technological information . . . and to facilitate the close coupling of scientific research with the commercial application of the useful findings of science."

The Committee also commissioned a Report by the Congressional Research Service entitled "Federal Management of Scientific and Technical Information (STINFO) Activities: The Role of the National Science Foundation." This report examines the role of the National Science Foundation in federal management of scientific and technical information. The report proposes the establishment of a STINFO panel reporting to the President's Science Adviser. This panel would monitor and evaluate STINFO programs, taking into account quality, costs, and competition, as well as user needs. The panel would also foster STINFO research and development, and develop policies designed to ensure reasonable balance between federal funding of government and private sector information services.

It is the intention of the Committee to request the new White House science office to review and make recommendations concerning the findings of the STINFO Report. The Committee also expects to play an active role in urging full Foundation participation in these efforts, in setting future goals, in assessing alternative ways of reaching them, and in the consideration of specific courses of action.

BEHAVIORAL AND SOCIAL SCIENCES

The Committee has recommended approval of the Administration's request for NSF's behavioral and social sciences support programs.

This consists of \$24,690,000 for the behavioral and neural sciences subelement and \$20,584,000 for the social sciences subelement of the request for the Directorate of Biological, Behavioral, and Social Sciences, and \$23,995,000 for the productivity subelement of the Research Applied to National Needs (RANN) program, in the Research Applications Directorate.

The behavioral and social sciences programs supported by the Directorate of Biological, Behavioral and Social Sciences are intended to advance the Nation's storehouse of knowledge regarding essential aspects of human behavior and social interaction. The programs are designed also to promote the development of methods and techniques required to enhance the state-of-the-art of these sciences. The disciplines encompassed include: anthropology, linguistics, neurobiology, psychobiology, social psychology, economics, geography, sociology, and political science, and the special program areas of law and social sciences, science policy and the history of science, and social indicators.

In approving the budget request, the Committee underscores the importance of the findings of the interim report, released in February 1976, of the Committee on the Social Sciences in the National Science Foundation, established in the National Academy of Sciences at NSF's request. The Committee reported that:

* * * the quality of the basic research projects in social and behavioral science supported by NSF is generally excellent. * * * [However] there is also a large volume of excellent proposals that are rejected because they cannot be supported within the present program budgets.

The National Science Foundation is the second largest Federal source, after the Department of Health, Education, and Welfare, for basic research in these sciences, and in the cases of some disciplines, virtually the only source of Federal support funds. However, the social and behavioral sciences do not appear to have received a level of funding commensurate with the growth in number of competent researchers, nor with the Nation's need to use the findings of these disciplines. On this point the Academy study notes:

Many important investigations of high quality are now underfunded, or completely unfunded. Since only about 30 percent of the qualified investigators in the social and behavioral sciences are supported in their research by Federal funds, the pool of available research talent in these fields is adequate for substantial expansion of activity. (An average of about 58 percent in the other sciences are so supported.)

The Administration's current request for the behavioral and social sciences in the Division of Biological, Behavioral and Social Sciences constitutes an increase of \$6.49 million over the fiscal year 1976 budget. While this is not a large increase, the Committee emphasizes the need for the Foundation to consider using these funds to support those research opportunities the National Academy of Sciences has identified as warranting additional support. These include, for instance, "long-term commitment(s)" to " * * * longitudinal studies over extended time periods, comparative research across nations and cultures, research facilities of national importance (e.g., survey research organizations, a national laboratory for information processing

psychology, a psychoacoustical center, large data bases, [and] institutes for advanced study)."

With respect to the problem-oriented applied social science support program of RANN, the Committee notes the Academy committee's findings that the quality of social science research supported in RANN is " * * * highly variable in quality and, on average, not impressive." This Committee is aware of the Foundation's critical reactions to the Academy's report to which the Foundation responded:

In essence, * * * according to the Interim Report, the purpose of RANN should be to produce knowledge applicable to the solution of problems, whereas the approved purpose of RANN is to apply knowledge to the solution of problems. These purposes are basically different, as are the criteria for choosing and judging research to achieve these purposes. Clearly, then, the findings and recommendations of the Interim Report on RANN are derived from an incorrect basic premise and they are therefore inevitably uninformative and often misleading.

The Committee requests that the National Science Foundation reassess its position. It seems readily apparent that national resources will be wasted if research support is confined to promoting the application of what might be inadequate or partially developed social knowledge. Neither this Committee nor the Congress as a whole has intended that the RANN program overemphasize application to the detriment of producing and applying knowledge to help meet our greatest national needs. The need to interpret correctly RANN's mission must be weighed against the importance of the problem areas including: service delivery in the public sector; benefits and costs of Federal assistance programs, the effects of Federal regulations, and issues of technology transfer.

Therefore, this Committee endorses the Academy committee's recommendations for improving the RANN social sciences programs and instructs the Foundation to enlist greater participation of social scientists in developing RANN programs and proposal solicitations, in evaluating proposals, and in securing user participation in studies. The Committee also requests RANN to evaluate proposals for both relevance to national needs and scientific quality and requests that the Foundation insure that problem-oriented applied research rest securely on adequate storehouses of fundamental knowledge.

LISTING OF COMPLETED GRANTS AND CONTRACTS

The Committee strongly recommends that the foundation make available to the public and to the Congress a monthly listing of grants and contracts completed during the previous thirty-day period. The Committee has found the listing of grants and contracts awarded provided by the Foundation to be most useful, and feels that a similar listing of completed projects would be an important aid to members of the public and of Congress in identifying reports of particular interest, in obtaining the material, and in making use of the findings and recommendations included in those reports.

The Committee suggests that the listing include the following information: (1) the organization, name and address, and principal investigator conducting the grant or contract; and (2) the title, duration and amount of the grant or contract.

The Committee urges that a system for preparing and circulating these lists be developed in the next few months and feels that by the beginning of 1977 it should be well-established.

ACTIVITIES PURSUANT TO THE FREEDOM OF INFORMATION ACT AND THE FEDERAL ADVISORY COMMITTEE ACT

(i) Use of Advisory Committees

The Committee believes that Advisory Committees can serve a useful and critically important function in the development and implementation of Foundation programs. They provide an essential opportunity for the Foundation to benefit from the advice and experience of scientists and non-scientists from both the public and private sectors.

The Committee is concerned, however, over the implications of a listing furnished by the Foundation of 54 of its advisory committees, their purposes, and the dates of their meetings in 1975. Twenty-two of the committees listed met once or not at all during 1975; twenty-seven met only two or three times; and four met between four and seven times. The Advisory Committee on Science Education, which is composed of a number of smaller panels and was involved in the review of precollege curriculum programs, held a total of seventeen meetings.

The Committee urges that the Foundation make fuller use of its advisory committees, their potential to make major contributions to the establishment of Foundation programs and priorities, and their ability to serve as a constant source of advice in the program planning which takes place as part of the budget process.

(ii) Access to Meetings and Information

To clarify concerns which have been raised over the Foundation's response to inquiries and requests pursuant to the Freedom of Information Act and the Federal Advisory Committee Act and to provide a basis on which to determine the adequacy of the Foundation's response to the provisions of those Acts, the Committee requests that the Foundation prepare a report on activities pursuant to these Acts.

With respect to the Freedom of Information Act, the report should include the following information: (a) the source of each inquiry and the nature of the material requested from the Foundation; (b) the basis on which each inquiry was granted or denied; (c) the time and personnel resources required by the Foundation to compile and furnish the material so requested together with the cost of that requirement; and (d) the amount of the charges made, if any, for complying with each request, and the basis for granting or denying each waiver.

With respect to the Federal Advisory Committee Act, the report should include the following information: (a) a listing of all Advisory Committees serving the Foundation and their membership; (b) the number of Advisory Committee meetings held since January 1, 1975; (c) the number of Advisory Committee meetings held since January 1, 1975, which were closed or partially closed to the public; (d) a statement of the subject matter covered by each Advisory Committee at a closed or partially closed meeting, the specific reason why the meeting was closed or partially closed, and whether a transcript of the proceedings was made; (e) a statement on each denial of a request to appear before, or to attend or to file a statement with any Advisory Committee made pursuant to the provisions of the Federal Advisory

Committee Act, the basis on which the request was denied, the source of the request, and the nature of the Advisory Committee meeting involved.

PERSONNEL LEVELS AND ADJUSTMENTS TO REFLECT CHANGES IN BUDGET ALLOCATIONS

The Committee notes that staffing levels have remained virtually constant throughout the Foundation's directorates since fiscal year 1975, with the exception of the transfer of forty-five positions from RANN to the Energy Research and Development Administration in January of 1975. During that period, the budget for Mathematical and Physical Sciences and Engineering has increased by 29%; the budget for Astronomical, Atmospheric, Earth and Ocean Sciences has increased by 33%; the budget for Biological, Behavioral and Social Sciences has increased by 27%; the budget for Science Education has declined by 12%; and the budget for Research Applied to National Needs has declined by 23%.

It is the view of the Committee that the Foundation's management, administration and oversight of grants and contracts would be strengthened significantly by personnel assignments which more closely reflect budget allocations. The Committee feels that the present personnel ceiling of 1300 is adequate to provide sound program development, management, and oversight provided that available positions are allocated in a manner which is responsive to the program complexity and size of the budgets administered by each Directorate.

The Committee also expects that in the future more attention will be focused by the Foundation on this aspect of its budget presentation.

WESTERN PROJECTS OFFICE

A Western Projects Office was opened by the Foundation in April of 1975 to serve as a field office of the Research Applications Directorate.

The Committee is concerned that this office, the only field facility ever established by the Foundation, was taken without prior consultation with the Committee and without formal approval or consideration by the National Science Board. This concern was heightened by the results of a limited survey conducted by the Committee of 160 RANN grant recipients in Western States which showed that there are fewer than 10 research grant recipients with whom the office is in continuing contact. Of the seventy principal investigators who replied to the survey 26 were not even aware of the existence of the office; 48 had never been contacted by the office; 56 had never been visited by personnel from the office; 54 indicated that the existence of the Office had not facilitated contacts with the Foundation.

The results of the survey showed that there are fewer than 10 research grant recipients with whom the office is in continuing contact.

The mandate of the Western Projects Office as described by the Director of the Foundation is one which the Committee endorses. It is to be responsible for:

Identifying and defining areas of national need for which research is required;

Assisting in the establishment of projects and utilization of RANN research results in the public and private sector;

Developing working relationships with all relevant institutions in industry, universities, State and local governments, and Federal field offices in the western portion of the United States;

Managing assigned research projects;

Ensuring application and dissemination of research results.

The Committee is deeply concerned that the Office does not appear to be fulfilling this mandate. Significant opportunities to provide a close link between the Foundation and the applied research resources in the western States have not been realized. A thorough effort has not been made to publicize the existence and services of the office. Frequently the office has not been able to provide up to date information concerning RANN programs and activities.

The Committee strongly urges the Foundation to upgrade the capabilities and activities of the Western Projects Office, and is requesting that it be kept informed on a quarterly basis during the coming fiscal year of the activities of the Office. If further field offices are to be established consultation with Congressional oversight committees and the National Science Board should precede such action.

REORGANIZATION OF THE FOUNDATION

During the past year, the National Science Foundation has undertaken a reorganization to improve communication between the Director and the staff at the program level. This reorganization also served to centralize most Foundation offices which are engaged in science analysis and policy studies relating to science by placing those activities within a single new directorate, entitled "Scientific, Technological and International Affairs" (STIA).

This reorganization constituted a structural revision of the basic research activities of the Foundation, which had heretofore been under the aegis of the Research Directorate. The new organization divided basic research into three directorates having the respective titles of: "Mathematical and Physical Sciences and Engineering; Astronomical, Atmospheric, Earth and Ocean Sciences"; and "Biological, Behavioral and Social Sciences." In addition, a number of offices of the former research directorate were given increased status: sections became divisions and certain of the larger research programs were given section status.

This reorganization creates the opportunity for improved recognition within NSF of a number of research areas, particularly those outside of the mathematical and physical sciences, and engineering. There are also obvious benefits to be derived from having units which perform science analysis and policy studies working in greater proximity. In this regard, the Committee urges the Foundation to reconsider its decision to place the Science and Society Program under the aegis of the Education Directorate. The breadth of the issues addressed by the elements of this program and their potential impact on all aspects of research, science education and science policy, leads the Committee to believe that this program falls more appropriately under the jurisdiction of the Directorate for Science, Technology and International Affairs.

The Committee feels, however, that more effective management is the key element in improving operations within the Foundation, and that structure only provides the means whereby that management can

operate. The new structure of the Foundation would seem to shorten some lines of communication within NSF and to give greater identity to certain research areas. On the other hand, communication will not be improved unless senior NSF management takes initiative in adopting policies, practices and procedures which will increase the participation of the program-level staff, and of the Foundation's many advisory committees, in the decisionmaking process.

The Committee feels that one of the Foundation's most important roles is in establishing priorities for the use of its funds. The National Science Foundation is in a unique position, because of its broad and close contact with the science community, to identify areas where science is beginning to make new progress and to ensure the vigorous development of those areas by making adjustments, where necessary, in its distribution of research support among fields and subfields. While the Foundation's role should certainly not be to manage science, that does not obviate the necessity for careful analysis and possible revisions of NSF's resources among fields of science to strengthen the Nation's research potential.

The current rate of growth of Federal research support requires that the National Science Foundation play a more creative role in planning for basic science. As the Federal agency with unique responsibility for improving the Nation's research potential, NSF's activities must continue to expand the horizons of science in all directions. This will inevitably require that NSF plan alternative strategies for the use of its research funds, and that it may have to redeploy its resources to provide for increased activities in areas which evidence new vigor and growth. This will require that the Foundation make vigorous use of its advisory bodies at all levels and of its program-level staff to collect information and to make recommendations for planning by NSF's senior administration. The Committee hopes that the new structure which the Foundation has adopted will facilitate the flow of advice and information and will improve the Foundation's capabilities in planning and analysis so as to enable the Director to set priorities, and to effect budgetary changes, reflecting the continuing expansion of science into new areas and in new directions.

BIENNIAL AUTHORIZATION

During the coming months the Committee is interested in exploring the possibility of providing a two-year authorization for National Science Foundation.

By adopting such a procedure, the Congress could provide a framework for program planning that would bring increased stability to the Foundation's planning process. Ongoing programs of the Foundation, including support of research, science education, and related science activities, could be covered by the two-year authorization. New programs and projects would continue to require special authorization during the two-year period.

This procedure would permit the National Science Foundation and the Congress to focus attention on areas where new programs or projects are being proposed and are deemed to be of sufficient urgency to warrant special authorization. It would enable the Committee to conduct special oversight activities during the period between the authorizations and to focus at that time on programs and policies of particular interest and/or concern.

The Committee wishes to consider this new procedure in order to provide the close Congressional oversight necessary to insure program accountability to the Congress and to the public generally, and will examine its implications with the scientific community, members of the public and the National Science Foundation.

EMPLOYMENT OPPORTUNITIES FOR THE MENTALLY RETARDED

In addition to the activities on behalf of the handicapped authorized in Section 205 of S. 3202, the Committee wishes to express its special interest in the status of the mentally retarded and their eligibility for appropriate positions with the National Science Foundation and with recipients of National Science Foundation grants and contracts.

The Committee wishes to call to the particular attention of the Foundation the action of the Civil Service Commission in 1964 which established special hiring procedures, in lieu of formal testing, for the mentally retarded. The Committee points out that under these procedures the mentally retarded are eligible for employment when a rehabilitation counsellor certifies that they are emotionally, physically and mentally ready for work.

The Committee wishes to emphasize the importance of providing employment opportunities for the mentally retarded. It strongly urges the National Science Foundation and all recipients of NSF funds to provide these opportunities to the greatest extent possible and to advise the Civil Service Commission and organizations committed to employment opportunities for the mentally retarded of their particular interest in providing such opportunities.

V. Congressional Budget Office Report

Pursuant to Section 403 of the Congressional Budget Act of 1974 the report of the Congressional Budget Office follows:

CONGRESSIONAL BUDGET OFFICE COST ESTIMATE—MAY 12, 1976

1. Bill number: S. 3202
2. Bill title: National Science Foundation Authorization Act, 1977.
3. Purpose of bill: The major purpose of this bill is to authorize appropriations for activities of the National Science Foundation for FY 1977. The bill also includes provisions concerned with national and international needs and resources and with national science and technology policy.
4. Cost estimate: The bill has no budget effects for FY 1976 or the transition quarter. Only the authorization included in this bill is considered, and no judgement is made about the authorizations this bill implies for future periods. The overall budget impact follows:

	BUDGET EFFECTS				
	[In millions of dollars; fiscal year]				
	1977	1978	1979	1980	1981
Authorization level.....	832	-----	-----	-----	-----
Costs.....	209	422	126	47	28

5. Basis for estimate:

All the funding authorized in this bill is assumed to be obligated in fiscal year 1977. The major account for the National Science Foundation (NSF) is its salary and expenses account. Other funding authorized in this bill is for the scientific activities (Special Foreign Currency Program) account.

Salaries and expenses.—The funding for this account is authorized in Title I of this bill. Most of NSF's activities are funded through this account. The major NSF programs are listed below with the levels of appropriation authorized.

[In thousands of dollars]	Authoriza- tion level
Mathematical and physical sciences and engineering.....	233, 250
Astronomical, atmospheric, Earth, and ocean sciences.....	247, 000
Biological, behavioral, and social sciences.....	132, 350
Science education programs.....	70, 200
Research applied to national needs.....	68, 100
Scientific technological, and international affairs.....	24, 000
Program development and management.....	43, 500
State science, engineering, and technology programs.....	8, 000
Total	826, 400

All funds are assumed obligated in fiscal year 1977. The costs over time resulting from obligations may differ significantly for research and non-research programs. The spend-out rates used here are a combination of data from aggregate level historical experience and a research/nonresearch program information. The payout rate assumed for the new State Science, Engineering and Technology program is 25 percent in the first year and 75 percent in the second year. The estimates follow.

	Fiscal year—				
	1977	1978	1979	1980	1981
Authorization level.....	826				
Costs.....	203	422	126	47	28

Scientific activities (Special Foreign Currency Program).—Title IV authorizes funding for this account, which provides for the use of United States-owned foreign currency to support cooperative scientific activity with foreign scientists. All funding is assumed obligated in fiscal year 1977.

	BUDGET EFFECTS				
	[In millions of dollars; fiscal year]				
	1977	1978	1979	1980	1981
Authorization level.....	6				
Costs.....	6				

6. Estimate comparison: This estimate is based on previous discussions about the historical experience of aggregate NSF pay-out rates with NSF budget personnel while estimating the cost of H.R.

11472. The differences between administration figures and the estimates above are due to the committee's increases in authorization levels and the inclusion in administration figures of \$10 million of deferred obligational authority.

7. Previous CBO estimate: A CBO estimate of H.R. 11472 was prepared on March 11, 1976.

VI. Vote in Committee

Pursuant to section 133(b) of the Legislative Reorganization Act of 1949, as amended, the following is a tabulation of votes in Committee: Motion to favorably report the bill to the Senate carried unanimously.

VII. Section-by-Section Analysis

Section 101. This section authorizes an appropriation for the National Science Foundation in the amount of \$826.4 million for the fiscal year ending September 30, 1977. The amount authorized to be appropriated is distributed in specific amounts to 8 program categories. Section 101(b). This subsection makes available specific amounts for sub-categories and provides for a minimum amount to be expended to small business concerns.

Section 102(a). This subsection directs the Foundation to require an acknowledgement of NSF support and a statement as to the responsibility for the findings, opinions, conclusions, or recommendations contained in any published material which is based on or developed under a project assisted by the Foundation.

Subsection (b) directs the Foundation to arrange for the dissemination of all substantive technical reports through the National Technical Information Service.

Subsection (c) requires each principal investigator under the program "Research Applied to National Needs" or any similar program within one year after completion of his project to report on the utilization of the results of his research and any barriers to utilization which have been identified.

Subsection (d) directs the Director of the Foundation to conduct a study of the feasibility of operating a supplementary peer review system in which the identity of the proposer is not known to the reviewers and to report within one year to the Senate Committee on Labor and Public Welfare and the House Subcommittee on Science and Technology.

Subsection (e). This subsection prohibits the Foundation from transferring funds to or from a particular category listed in section 101 if the amount so transferred exceeds 10% of the total funds in that particular category unless the appropriate House and Senate committees are notified in writing and the Director waits 30 legislative days before taking final action or these committees notify the Director in writing that they have no objection to such transfer.

Section 201. This section authorizes and directs the Foundation to support basic and applied research and education programs and to conduct and support policy analysis, information dissemination and international cooperative programs to make the results of foreign research more readily available to American scientists, engineers and

technologists, to promote international cooperation in science and technology to assist in solving problems such as world food and population problems and to insure coordination of these programs with programs of other federal agencies.

Subsection (b). This subsection directs the Foundation, in cooperation with certain other agencies to study international scientific research, education and policy analysis and report to the House and Senate oversight committees by March.

Section 202. This section directs the Foundation to encourage and promote interdisciplinary research through interdisciplinary undergraduate programs, research projects which provide for apprenticeship training, fellowship programs and arrangements for degree training including post-graduate degrees in more than one discipline in institutions of higher education.

Section 203. This section authorizes and directs the Foundation to conduct a "Science for Citizens Program" to (1) improve public understanding of public policy issues involving science and technology. (2) Facilitate the participation of scientists, engineers and graduate and undergraduate students in public activities aimed at the resolution of public policy issues having significant scientific and technology aspects, and (3) enable groups to acquire necessary technical expertise in dealing with the scientific and technical aspects of public policy. (b) This subsection requires that review panels established to evaluate proposals under this section shall have balanced membership from the scientific and non-scientific community and the public and private sectors.

The sum of \$3 million is earmarked for this program, and an augmented Public Understanding of Science Program.

Section 204. This section directs the Foundation to initiate a program of continuing education in science and engineering to enable experienced scientists and engineers to render more valuable contributions to the nation.

Subsection (b). This subsection requires that the program shall include the development of special curricula and educational techniques and the award of fellowships.

Subsection (d). This subsection authorizes the Foundation to allocate fellowships under this section in such a manner as to attract highly qualified applicants and provide an equitable distribution of such fellowships throughout the United States.

The sum of \$1 million is earmarked for this program.

Section 205(a). This subsection directs the Foundation to intensify its search for qualified women, minorities and handicapped individuals to fill executive level positions in the Foundation and to increase the numbers of women, minorities and the handicapped on advisory committees and panels of the Foundation and report quarterly to the Congress.

Subsection (b). This subsection provides that notwithstanding any other provision of this or any other Act, \$5 million shall be available for the program "Minority Institutions Improvement" and \$2.5 million for a Program "Minorities, Women, and Handicapped Individuals in Science" for experimental forums or other activities designed to improve scientific literacy and to encourage and assist minorities, women, and handicapped individuals to enter the sciences.

Subsection (d) (1). This subsection authorizes and directs the Foundation in order to increase minorities in science, to award planning grants for programs, including but not limited to Minority Centers for Graduate Education in Science and Engineering at geographically dispersed institutions with substantial minority enrollment that are located near minority population centers. The Director shall consult with minority groups in establishing criteria for planning groups, and report to the House and Senate oversight committees on the results of these activities by March 31, 1977.

The sum of \$2 million is earmarked for this program.

Section 206. The Foundation is directed to establish an Office of Small Business Research and Development within the Office of Government and Public Programs, in cooperation with the Small Business Administration to: foster communication between the Foundation and the small business community; collect and publish information concerning NSF awards to small business concerns and procedures for handling proposals for such concerns; assist small business concerns to obtain information about NSF programs and procedures and assure expeditious processing of proposals; recommend any changes required to increase the utilization of small business concerns; prepare a report on the scientific and technical expertise and capability in the small business community in collaboration with organizations representing small business concerns; and report quarterly to the Congress.

Section 207. This section authorizes the Foundation to make grants to states to increase their capacity to apply science, engineering and technology to meet the needs of their citizens. Grants of up to \$100,000 each are authorized for the executive and legislative branches of state governments with at least 20% of the cost of their activities to be borne by the state receiving the grant.

The sum of \$8 million is authorized for this program.

Section 208. This section authorizes NSF to establish a 24-member "advisory council" only if at least six of the members are non-scientists, and the council furnishes advice to the Board and the Director on broad policy matters relating to science, research and education and promotes public understanding and access to information concerning the Foundation.

Section 301. This section amends section 3(d) of the National Science Foundation Act to direct the Foundation to recommend and encourage the pursuit of national policies designed to foster research and education in science and engineering, and the application of scientific and technical knowledge to the solution of national and international problems.

Section 302. This section amends section 4(a) of the National Science Foundation Act by adding provisions that policies for the Foundation shall be established by the Board within the framework of applicable national policies as set forth by the President and the Congress. This section also amends section 4(c) of the National Science Foundation Act to include in the qualifications for membership on the Board eminence in industry to provide representation of the views of leaders from a diversity of points of field and points of view and to increase the number and broaden the range of organizations whose nominations for Board membership must be considered by the President.

Subsection (b) of this section amends section 4 of the Act to insert a new subsection (g) to require the National Science Board to submit an annual report to the President and the Congress on the status and health of science.

Subsection (c) of this section amends section 4(h) of such Act to require consultation with the Chairman of the Board before the Director appoints members to the Board staff. It also authorizes payment of members of the Board staff at rates not to exceed the rate applicable to GS-18.

Section 303. This section authorizes the Foundation to gather and analyze data relating to research and engineering activities and the availability of scientific, engineering and technical manpower to assist in the appraisal of the implementation of the policies set forth in Title I of the National Science and Technology Policy, Organization and Priorities Act of 1976 and to provide this and additional information and staff assistance to the Office of Science and Technology Policy as requested.

Section 401. This section authorizes \$6 million to be appropriated for expenses incurred outside the United States to be financed from foreign currencies which the Treasury Department determines to be in excess of the normal requirements of the United States.

Section 402. This section provides \$5,000 for use by the Director of the National Science Foundation at his discretion. This money may be used for official consultation, representation and other extraordinary expenses.

Section 403. This section provides that appropriations made pursuant to the Act shall remain available for obligation and expenditure for the period of time specified in the Appropriation Act.

Section 404. This section requires that the Director of the Foundation keep the House Science and Technology Committee and the Senate Labor and Public Welfare Committee fully and currently informed on all activities of the Foundation.

VIII. Changes in Existing Law

In compliance with subsection (4) of rule XXIX of the Standing Rules of the Senate, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets; new matter is printed in italic) :

NATIONAL SCIENCE FOUNDATION ACT OF 1950*

(PUBLIC LAW 507—81ST CONGRESS)*

(64 STAT. 149)

(S. 247)

AN ACT

To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense; and other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Science Foundation Act of 1950."

ESTABLISHMENT OF NATIONAL SCIENCE FOUNDATION (42 U.S.C. § 1861)

SEC. 2. There is hereby established in the executive branch of the Government an independent agency to be known as the National Science Foundation (hereinafter referred to as the "Foundation"). The Foundation shall consist of a National Science Board (hereinafter referred to as the "Board") and a Director.

FUNCTIONS OF THE FOUNDATION (42 U.S.C. § 1862)

SEC. 3. (a) The Foundation is authorized and directed—

(1) to initiate and support basic scientific research and programs to strengthen scientific research potential and science education programs at all levels in the mathematical, physical, medical, biological, engineering, social, and other sciences, by making contracts or other arrangements (including grants, loans, and other forms of assistance) to support such scientific and educational activities and to appraise the impact of research upon industrial development and upon the general welfare;

*As amended by: Act of April 5, 1952 (P.L. 82-298; 66 Stat. 43), Act of Aug. 8, 1953 (P.L. 83-223; 67 Stat. 488), Act of July 11, 1958 (P.L. 85-510; 72 Stat. 353), Act of Sept. 8, 1959 (P.L. 86-232; 73 Stat. 467), Act of June 11, 1960 (P.L. 86-507; 74 Stat. 200), Act of June 29, 1960 (P.L. 86-550; 74 Stat. 256), Act of Oct. 16, 1962 (P.L. 87-335; 76 Stat. 1069), Act of July 18, 1968 (P.L. 90-407; 82 Stat. 360), Act of November 18, 1969 (P.L. 91-120; 83 Stat. 203), Act of August 10, 1972 (P.L. 92-372; 86 Stat. 526), and Act of October 13, 1972 (P.L. 92-484; 86 Stat. 797).

(2) to award, as provided in section 10, scholarships and graduate fellowships in the mathematical, physical, medical, biological, engineering, social, and other sciences;

(3) to foster the interchange of scientific information among scientists in the United States and foreign countries;

(4) to foster and support the development and use of computer and other scientific methods and technologies, primarily for research and education in the sciences;

(5) to evaluate the status and needs of the various sciences as evidenced by programs, projects, and studies undertaken by agencies of the Federal Government, by individuals, and by public and private research groups, employing by grant or contract such consulting services as it may deem necessary for the purpose of such evaluations; and to take into consideration the results of such evaluations in correlating the research and educational programs undertaken or supported by the Foundation with programs, projects, and studies undertaken by agencies of the Federal Government, by individuals, and by public and private research groups;

(6) to maintain a current register of scientific and technical personnel, and in other ways to provide a central clearinghouse for the collection, interpretation, and analysis of data on the availability of, and the current and projected need for, scientific and technical resources in the United States, and to provide a source of information for policy formulation by other agencies of the Federal Government; and

(7) to initiate and maintain a program for the determination of the total amount of money for scientific research, including money allocated for the construction of the facilities wherein such research is conducted, received by each educational institution and appropriate nonprofit organization in the United States, by grant, contract, or other arrangement from agencies of the Federal Government, and to report annually thereon to the President and the Congress.

(b) The Foundation is authorized to initiate and support specific scientific activities in connection with matters relating to international cooperation, national security, and the effects of scientific applications upon society by making contracts or other arrangements (including grants, loans, and other forms of assistance) for the conduct of such activities. When initiated or supported pursuant to requests made by any other Federal department or agency, including the Office of Technology Assessment, such activities shall be financed whenever feasible from funds transferred to the Foundation by the requesting official as provided in section 14(g), and any such activities shall be unclassified and shall be identified by the Foundation as being undertaken at the request of the appropriate official.

(c) In addition to the authority contained in subsections (a) and (b), the Foundation is authorized to initiate and support scientific research, including applied research, at academic and other nonprofit institutions. When so directed by the President, the Foundation is further authorized to support, through other appropriate organizations, applied scientific research relevant to national problems involving the public interest. In exercising the authority contained in this subsection, the Foundation may employ by grant or contract such consulting services as it deems necessary, and shall coordinate and

correlate its activities with respect to any such problem with other agencies of the Federal Government undertaking similar programs in that field.

(d) The [Board and the Director] *Foundation* shall recommend and encourage the pursuit of national policies [for the promotion of basic] *designed to foster* research and education in [science] *science and engineering, and the application of scientific and technical knowledge to the solution of national and international problems.*

(e) In exercising the authority and discharging the functions referred to in the foregoing subsections, it shall be one of the objectives of the Foundation to strengthen research and education in the sciences, including independent research by individuals, throughout the United States, and to avoid undue concentration of such research and education.

(f) The Foundation shall render an annual report to the President for submission on or before the 15th day of January of each year to the Congress, summarizing the activities of the Foundation and making such recommendations as it may deem appropriate. Such report shall include information as to the acquisition and disposition by the Foundation of any patents and patters right.

NATIONAL SCIENCE BOARD (42 U.S.C. § 1863)

SEC. 4. (a) The Board shall consist of twenty-four members to be appointed by the President, by and with the advice and consent of the Senate, and of the Director ex officio. In addition to any powers and functions otherwise granted to it by this Act, the Board shall establish the policies of the Foundation, *within the framework of applicable national policies as set forth by the President and the Congress.*

(b) The Board shall have an Executive Committee as provided in section 7, and may delegate to it or to the Director or both such of the powers and functions granted to the Board by this Act as it deems appropriate.

(c) The persons nominated for appointment as members of the Board (1) shall be eminent in the fields of [the basic, medical, or social sciences] *science, social sciences, engineering, agriculture, industry education, [research management] or public [affairs;] affairs.* (2) shall be selected solely on the basis of established records of distinguished service, and (3) shall be so selected a to provide representation of the views of [scientific] *leaders from a diversity of fields and points of view [in] from all areas of the Nation. [The President is requested, in] In the making of nominations of [persons] individuals for appointment as members. [to] the President shall give consideration to any recommendations for nomination which may be submitted to him by the National Academy of Sciences, National Academy of Engineering, the National Association of State Universities and Land Grant Colleges, the Sea-Grant Association, the Association of American Universities, the Association of American Colleges, the Association of State Colleges and Universities, the American Association of Community and Junior Colleges, by other scientific, technical, public interest, or educational associations and by [or by other scientific or educational] organizations committed to the advancement of minorities, women, and handicapped individuals in science.*

(d) The term of office of each member of the Board shall be six years; except that any member appointed to fill a vacancy occurring prior to the expiration of the term for which his predecessor was appointed shall be appointed for the remainder of such term. Any person, other than the Director, who has been a member of the Board for twelve consecutive years shall thereafter be ineligible for appointment during the two-year period following the expiration of such twelfth year.

(e) The Board shall meet annually on the third Monday in May unless, prior to May 10 in any year, the Chairman has set the annual meeting for a day in May other than the third Monday and at such other times as the Chairman may determine, but he shall also call a meeting whenever one-third of the members so request in writing. A majority of the members of the Board shall constitute a quorum. Each member shall be given notice, by registered mail or certified mail mailed to his last known address of record not less than fifteen days prior to any meeting, of the call of such meeting.

(f) The election of the Chairman and Vice Chairman of the Board shall take place at each annual meeting occurring in an even-numbered year. The Vice Chairman shall perform the duties of the Chairman in his absence. In case a vacancy occurs in the chairmanship or vice chairmanship, the Board shall elect a member to fill such vacancy.

(g) *The Board shall prepare and submit on or before January 31 in each year an annual report to the President and to the Congress, on the status and health of science and of its various disciplines. The report may include such recommendations as the Board may deem timely and appropriate.*

[(g)] (h) The Board may, with the concurrence of a majority of its members, permit the appointment of a staff consisting of not more than five professional staff members and such clerical staff members as may be necessary. Such staff shall be appointed by the Director *after consultation with the Chairman of the Board* and assigned at the direction of the Board. The professional members of such staff may be appointed without regard to the provisions of title 5, United States Code, governing appointments in the competitive service, and the provisions of chapter 51 of such title relating to classification, and compensated at a rate not exceeding the appropriate rate provided for individuals in grade [GS-15] GS-18 of the General Schedule under section 5332 of such title, as may be necessary to provide for the performance of such duties as may be prescribed by the Board in connection with the exercise of its powers and functions under this Act. Each appointment under this subsection shall be subject to the same security requirements as those required for personnel of the Foundation appointed under section 14(a).

[(h)] (i) The Board is authorized to establish such special commissions as it may from time to time deem necessary for the purposes of this Act.

[(i)] (j) The Board is also authorized to appoint from among its members such committees as it deems necessary, and to assign to committees so appointed such survey and advisory functions as the Board deems appropriate to assist it in exercising its powers and functions under this Act.

Ninety-fourth Congress of the United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Monday, the nineteenth day of January, one thousand nine hundred and seventy-six

An Act

Authorizing appropriations to the National Science Foundation for fiscal year 1977.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That this Act may be cited as the "National Science Foundation Authorization Act, 1977."

AUTHORIZATION FOR ACTIVITIES OF THE NATIONAL SCIENCE FOUNDATION

SEC. 2. (a) There is authorized to be appropriated to the National Science Foundation for the fiscal year 1977, for the following categories:

- (1) Mathematical and Physical Sciences and Engineering, \$231,525,000.
- (2) Astronomical, Atmospheric, Earth and Ocean Sciences, \$244,850,000.
- (3) Biological, Behavioral, and Social Sciences, \$130,425,000.
- (4) Science Education Programs, \$69,400,000.
- (5) Research Applied to National Needs, \$69,000,000.
- (6) Scientific, Technological, and International Affairs, \$22,000,000.
- (7) Program Development and Management, \$43,500,000.

(b) The National Science Foundation shall recommend and encourage the pursuit of national policies designed to foster research and education in science and engineering, and the application of scientific and technical knowledge to the solution of national and international problems.

(c) The National Science Foundation is authorized and directed to provide assistance to the Office of Science and Technology Policy established by the "Presidential Science and Technology Advisory Organization Act of 1976" (42 U.S.C. 6611).

(d) Notwithstanding any other provision of this or any other Act not less than 10 per centum of the amount authorized for category (5) of subsection (a) of this section shall be expended to small business concerns.

(e) (1) The National Science Foundation shall establish uniform procedures for establishing the responsibility for material published with the assistance of or under the sponsorship of the Foundation. The Foundation shall also establish procedures for reporting on the utilization of research projects assisted under the program "Research Applied to National Needs".

(2) The National Science Foundation shall arrange for the dissemination of all substantive technical reports through the National Technical Information Service of the Department of Commerce.

(3) In the conduct of the energy research and development activities under the "Research Applied to National Needs" category, the National Science Foundation shall coordinate all new energy research project awards with the Administrator of the Energy Research and Development Administration or his designee.

(f) The Director of the National Science Foundation is authorized and directed to conduct a feasibility study of operating the peer review system used in the evaluation of grant proposals within the Founda-

tion so as to assure that the identity of the proposer is not known to the reviewers of the proposal. Any such system shall be considered to supplement and not to supplant the peer review system in operation in the Foundation on the date of enactment of this Act.

(g) No funds may be transferred from any particular category listed in section 2(a) to any other category or categories listed in such section if the total of the funds so transferred from that particular category would exceed 10 per centum thereof, and no funds may be transferred to any particular category listed in section 2(a) from any other category or categories listed in such section if the total of the funds so transferred to that particular category would exceed 10 per centum thereof unless—

(1) a period of thirty legislative days has passed after the Director or his designate has transmitted to the Speaker of the House of Representatives and to the President of the Senate and to the Committee on Science and Technology of the House of Representatives and to the Committee on Labor and Public Welfare of the Senate a written report containing a full and complete statement concerning the nature of the transfer and the reason thereof, or

(2) each such committee before the expiration of such period has transmitted to the Director written notice to the effect that such committee has no objection to the proposed action.

INTERNATIONAL SCIENTIFIC RESEARCH, EDUCATION, AND
POLICY ANALYSIS

SEC. 3. The National Science Foundation is authorized and directed to support basic and applied research and education programs, and to conduct and support policy analysis, information dissemination, and international cooperative programs consistent with the Nation's foreign policy objectives designed to make the results of scientific research conducted abroad more readily available to United States scientists, engineers, and technologists, to promote international cooperation in science and technology, to assist in the resolution of critical and emerging problems with significant scientific or technical components, such as world food and population problems, and to insure full coordination of these programs with related activities conducted by other Federal agencies and organizations. The Director of the National Science Foundation shall consult with the Secretary of State to assure that the programs authorized under this section are consistent with the foreign policy objectives of the United States.

INTERDISCIPLINARY RESEARCH

SEC. 4. The National Science Foundation is directed to encourage and promote the conduct of interdisciplinary research through broadly based undergraduate interdisciplinary education programs, interdisciplinary research projects which provide for apprenticeship training, interdisciplinary fellowship programs, and arrangements for degree training, including postgraduate degrees in more than one discipline, in institutions of higher education.

SCIENCE FOR CITIZENS

SEC. 5. (a) The National Science Foundation is authorized and directed to conduct an experimental "Science for Citizens Program" and an augmented Public Understanding of Science Program under which funds will be available for pilot projects to:

(1) improve public understanding of science, engineering and technology and their impact on public policy issues.

(2) facilitate the participation of experienced scientists and engineers as well as graduate and undergraduate students in helping the public understand science, engineering and technology and their impact on public policies; and

(3) assist nationally recognized professional societies and groups serving important public purposes in conducting a limited number of forums, conferences, and workshops to increase public understanding of science and technology, and of their impact on public policy issues, after consideration of the following eligibility factors:

(A) the extent to which the proposal of the society or group will contribute to the development of facts, issues, and arguments relevant to public policy issues having significant scientific and technical aspects, and

(B) the ability of the society or group, using its own resources, to conduct such forums, conferences, and workshops.

(b) One or more review panels shall be established for the purpose of evaluating applications for awards under this section. The membership of each review panel shall have balanced representation from the scientific and nonscientific communities and the public and private sectors.

(c) No contract, grant or other arrangement shall be made under this Section without the prior approval of the National Science Board.

(d) To assist the Congress in evaluating activities initiated pursuant to this Section, the Director of the National Science Foundation, in consultation with a review panel having a balanced representation from the scientific and nonscientific community and the public and private sectors, is directed to prepare a comprehensive analysis and assessment of such activities to be submitted to the House Committee on Science and Technology and the Senate Committee on Labor and Public Welfare, not later than October 31, 1977. An interim report is required no later than March 1, 1977.

CONTINUING EDUCATION IN SCIENCE AND ENGINEERING

SEC. 6. (a) The National Science Foundation shall develop a program plan for continuing education in science and engineering in order to enable scientists and engineers who have been engaged in their careers for at least five years to pursue courses of study designed to—

(1) provide them with new knowledge, techniques, and skills in their special fields; or

(2) acquire new knowledge, techniques, and skills in other fields which will enable them to render more valuable contributions to the Nation.

(b) The program plan developed under this section shall include, but not be limited to—

(1) the development of special curricula and educational techniques for continuing education in science and technology; and

(2) the award of fellowships to scientists and engineers to enable them to pursue courses of study which provide continuing education in science and engineering.

(c) The Foundation is directed to provide the House Committee on Science and Technology and the Senate Committee on Labor and Pub-

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lic Welfare, not later than March 1, 1977, with a detailed report on the program plan developed under this section, including recommendations for its implementation in fiscal year 1978.

MINORITIES, WOMEN, AND HANDICAPPED INDIVIDUALS

SEC. 7. (a) The Director of the National Science Foundation shall initiate an intensive search for qualified women, members of minority groups, and handicapped individuals to fill executive level positions in the National Science Foundation. In carrying out the requirement of this subsection, the Director shall work closely with organizations which have been active in seeking greater recognition and utilization of the scientific and technical capabilities of minorities, women, and handicapped individuals. The Director shall improve the representation of minorities, women, and handicapped individuals on advisory committees, review panels, and all other mechanisms by which the scientific community provides assistance to the Foundation. The Director of the National Science Foundation shall report quarterly to the Congress on the status of minorities, women, and handicapped individuals and activities undertaken pursuant to this section.

(b) Notwithstanding any other provision of this or any other Act, the National Science Foundation shall, with funds available from the program "Minorities, Women, and Handicapped Individuals in Science" conduct experimental forums, conferences, workshops or other activities designed to improve scientific literacy and to encourage and assist minorities, women, and handicapped individuals to undertake and to advance in careers in scientific research and science education.

(c) (1) In order to promote increased participation by minorities in careers in science and engineering, the National Science Foundation is authorized and directed to make available planning and study grants for programs including, but not limited to, Minority Centers for Graduate Education in Science and Engineering in accordance with this subsection.

(2) The grants for Minority Centers for Graduate Education shall be used to determine the need for and feasibility of developing Centers to be established at geographically dispersed educational institutions which—

- (A) have substantial minority student enrollment;
- (B) are geographically located near minority population centers;
- (C) demonstrate a commitment to encouraging and assisting minority students, researchers, and faculty;
- (D) have an existing or developing capacity to offer doctoral programs in science and engineering;
- (E) will support basic research and the acquisition of necessary research facilities and equipment;
- (F) will serve as a regional resource in science and engineering for the minority community which the Center is designed to serve; and
- (G) will develop joint educational programs with nearby undergraduate institutions of higher education which have a substantial minority student enrollment.

(3) The Director, in consultation with groups which have been active in seeking greater recognition of the scientific and technical capabilities of minorities, shall establish criteria for the award of the grants, and shall report to the Committee on Science and Technology

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of the House of Representatives and the Committee on Labor and Public Welfare of the Senate on the results of activities including an evaluation and assessment of the entire program carried out under this subsection, not later than March 1, 1977.

OFFICE OF SMALL BUSINESS RESEARCH AND DEVELOPMENT

SEC. 8. The National Science Foundation is authorized and directed to establish an Office of Small Business Research and Development. The Foundation through the Office of Small Business Research and Development and in cooperation and consultation with the Small Business Administration shall—

(1) foster communication between the National Science Foundation and the small business community, and insure that the set-aside for small business concerns provided under this Act or any other Act authorizing appropriations for the National Science Foundation is fully and effectively utilized;

(2) collect, analyze, compile, and publish information concerning grants and contracts awarded to small business concerns by the Foundation, and the procedures for handling proposals submitted by small business concerns;

(3) assist individual small business concerns in obtaining information regarding programs, policies, and procedures of the Foundation, and assure the expeditious processing of proposals by small business concerns based on scientific and technical merit;

(4) recommend to the Director and to the National Science Board such changes in the procedures and practices of the Foundation as may be required to enable the Foundation to draw fully on the resources of the small business research and development community; and

(5) make quarterly reports to the Congress concerning the activities of the Office of Small Business Research and Development.

NATIONAL SCIENCE BOARD

SEC. 9. (a) Section 4 of the National Science Foundation Act of 1950 is amended by inserting before the period at the end of subsection (a) a comma and the following: "within the framework of applicable national policies as set forth by the President and the Congress".

(b) Section 4(g) of such Act as redesignated by this section is amended—

(1) by inserting after "the Director," the following: "after consultation with the Chairman of the Board"; and

(2) by striking out "GS-15" and inserting in lieu thereof "GS-18".

LIMITATION

SEC. 10. (a) In addition to such sums as are authorized by section 2, not to exceed \$6,000,000 is authorized to be appropriated for fiscal year 1977, for expenses of the National Science Foundation incurred outside the United States to be paid for in foreign currencies which the Treasury Department determines to be excess to the normal requirements of the United States.

(b) Appropriations made pursuant to this Act may be used, but not to exceed \$5,000 for official consultation, representation, or other extraordinary expenses upon the approval or authority of the Director of the National Science Foundation, and his determination shall be final and conclusive upon the accounting officers of the Government.

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(c) Appropriations made pursuant to this Act shall remain available for obligation, for expenditure, or for obligation and expenditure, for such period or periods as may be specified in Acts making such appropriations.

INFORMATION REQUIREMENT

SEC. 11. Notwithstanding any other provision of this or any other Act, the Director of the National Science Foundation shall keep the Committee on Science and Technology of the House of Representatives and the Committee on Labor and Public Welfare of the Senate fully and currently informed with respect to all of the activities of the National Science Foundation.

Speaker of the House of Representatives.

*Vice President of the United States and
President of the Senate.*