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NATIONAL SCIENCE FOUNDATION

WASHINGTON, D.C. 20550



November 19, 1976

OFFICE OF THE  
ASSISTANT DIRECTOR  
FOR ADMINISTRATION

MEMORANDUM

TO : John O. Marsh, Jr.  
Counsellor to the President

FROM : NSF Representative for the Transition

SUBJECT: Status of Transition Report

As you may know, the National Science Foundation has not been contacted by a representative of the transition operation under Mr. Watson. However, in anticipation of such a contact, the attached status report has been prepared.

We would, of course, welcome any comments or suggestions that you might wish to offer while we are awaiting a contact from Mr. Watson's representative.

*Eldon D. Taylor*  
Eldon D. Taylor

Attachment

NATIONAL SCIENCE FOUNDATION  
Background and Status Report  
November 19, 1976

1. NSF Characteristics

-- Enabling Legislation

Congress established the National Science Foundation in the National Science Foundation Act of 1950. The Act authorized and directed the Foundation, among other things, to initiate and support basic scientific research and programs to strengthen scientific research potential, to award fellowships in the sciences, to foster the exchange of scientific information and to cooperate in international scientific activities.

In 1968, Congress passed Public Law 90-407 amending the NSF Act of 1950 and significantly broadening the Foundation's authority and scope. It authorized the initiation and support of applied research at academic and other non-profit institutions and directed the Foundation to support the social as well as the physical sciences.

-- National Science Board

The NSF Act provides that the Foundation shall consist of a National Science Board and a Director. The Board and Director have complementary roles. The Board establishes substantive policy and approves certain specified actions; the Director is responsible for the administration of the Foundation.

The Board consists of twenty-four members and the NSF Director, who serves as an ex officio member. Both the Director and Board members are appointed for six-year terms by the President by and with the advice and consent of the Senate. The Board's Chairman is Dr. Norman Hackerman, President, Rice University. The Acting Director is Dr. Richard C. Atkinson. Dr. Atkinson, who served previously as NSF's Deputy Director, assumed his position as Acting Director when Dr. H. Guyford Stever was appointed head of the President's Office of Science and Technology Policy.

Since 1968, the Board has been responsible for submitting to the Congress through the President, an annual report on the status and health of science and its various disciplines. The latest reports were Science at the Bicentennial - A Report from the Research Community (April 1976) and Science Indicators -- 1974 (December 1975). Science at the Bicentennial reports the research community's views on conditions affecting research. Concern centered on dependability of funding for research, the vitality of the research system, freedom in research choices and attitudes toward science and technology.

## -- Budget

In terms of current dollars, the Foundation's budget has experienced significant growth over its twenty-five year history. In fiscal year 1952, the Foundation obligated \$3.5 million. By fiscal year 1969, the budget had grown to \$400 million, and by fiscal year 1976 to \$724 million. In fiscal year 1977, the Foundation's budget totals \$783 million.

In terms of constant dollars, the picture is considerably less impressive. The fiscal year 1977 budget represents a level of support approximately equal to or slightly less than that provided in fiscal year 1968.

Indicators in other budget-related areas reveal impressive growth in responsibility by the Foundation in recent years and dependence on it by the community of scientists and their institutions. Thus, in fiscal year 1969, the Foundation provided 12% of all Federal support for basic research; in FY 1976, its share was about 19%. In fiscal year 1975, the Foundation received a total of 21,000 proposals requesting \$2,085,000,000 in research support; of these, approximately 10,000 were funded for a total of \$607,000,000.

## -- Organization and Staffing

The Foundation is a small, highly centralized organization. Nearly all the Foundation's operations are located in the Washington, D.C. area with the great majority of employees located in the headquarters building at 1800 G Street, N.W. The exceptions are small (1 - 5 persons) scientific liaison offices in Bucharest and Tokyo and the Directorate for Research Applications' Western Projects Office in San Francisco. The Foundation's staff includes approximately 1300 personnel. Roughly one-third are Ph.D. scientists and engineers primarily involved in the evaluation of proposals and the management of specific programs for scientific research support.

The Foundation also provides support for the development and operation of five National Research Centers. There are four astronomy centers: the National Astronomy and Ionosphere Center (Arecibo, Puerto Rico), the Kitt Peak National Observatory (Tucson, Arizona), Cerro Tololo Inter-American Observatory (Chile), and the National Radio Astronomy Observatory (Greenbank, West Virginia); and one center for atmospheric studies, the National Center for Atmospheric Research (Boulder, Colorado).

## -- Congressional Oversight

Like other Federal agencies, the National Science Foundation and its activities fall within the jurisdiction of several Congressional Committees and subcommittees. The principal committees are:

-- House Committee on Science and Technology (Olin Teague, Democrat, Texas, Chairman)

-- House Appropriations Subcommittee on HUD -- Independent Agencies (Edward Boland, Democrat, Massachusetts, Chairman)

-- Senate Special Subcommittee on the National Science Foundation (Edward Kennedy, Democrat, Massachusetts, Chairman)

-- Senate Appropriations Subcommittee on HUD -- Independent Agencies (William Proxmire, Democrat, Wisconsin, Chairman)

## 2. Key Issues

### -- Key Personnel

In the very near future, filling vacancies among the Foundation's top management will, of necessity, become a high priority item. Since the appointment in August 1976 of the Foundation's Director, H. Guyford Stever, as head of the President's Office of Science and Technology Policy, the positions of Director and Deputy Director have been filled on an acting basis. One or more of the Foundation's Presidentially appointed Assistant Directors are expected to depart during the first half of 1977.

In the past, these positions have not usually figured in the transition from one Presidential administration to another. The Director serves a six-year term and only once in the past has the beginning of his term coincided with the inauguration of a new President. In recent years, the Foundation's practice has been to conduct a nation-wide search for possible Assistant Directors and then to prepare and forward to the President a short list of those best qualified, taking into consideration scientific and administrative experience.

### -- Management

During fiscal years 1975 and 1976, the Foundation revamped a substantial segment of its administrative structure and procedures. In the summer of 1975, it undertook a major reorganization, creating six program directorates and the Directorate for Administration. Substantial internal restructuring of the directorates has also been accomplished.

The vital area of peer review of research proposals has seen considerable change. The Foundation has issued guidelines for the selection of reviewers and for instructions to reviewers. It has also defined new policies on the release of proposal information to applicants.

To ensure adequate review of the evaluation process, Action Review Boards have been established in each program directorate. To provide applicants with an appeals mechanism, a formal reconsideration procedure has been initiated.

Other areas have not been neglected. NSF has issued guidelines to facilitate the timely processing of proposals and to ensure the receipt of final fiscal and technical reports. New issuances also standardize the paperwork associated with an award and redefine and simplify the categories of NSF grants.

The present fiscal year will probably see fewer new initiatives. Concentration will instead be on final implementation of changes already underway and monitoring and evaluating changes completed.

-- Congressional

Over the past few years, the Congressional Committees responsible for overseeing Foundation operations have expanded their traditional oversight roles significantly, often mandating new programs and procedural changes and, to an increasing degree, directing the preparation of reports and evaluative studies.

In the FY 1976 and FY 1977 NSF Authorization and Appropriation Acts and their accompanying Conference Reports, a number of new programs and other actions were mandated, including the following:

- Establishment of the Comprehensive Assistance to Undergraduate Science Education Program and the Research Initiation and Support Program
- Establishment of an experimental Science for Citizens Program and preparation of an assessment of its operations
- Development of a program plan for continuing education in science and education
- Establishment of a Minorities, Women and Handicapped Individuals Program and preparation of an assessment of its operations
- Establishment of an Office of Small Business Research and Development
- Requirement to expend not less than 10% of Research Applications Directorate funds to small business concerns

-- Requirement to assess, evaluate and report on Management Procedures in the Science Education Directorate

-- Requirement to conduct a study on the use of a "blind" peer review system so as to assure that the identity of the proposer is not known to the reviewers of the proposal

-- Establish procedures to make public monthly a list of completed awards and publish annually abstracts of all completed awards

-- Requirement to prepare a report on international scientific research, education and policy analysis

-- Programmatic

This section is organized by discipline, and while it does not provide a comprehensive coverage of all the important science being supported by NSF, it does illustrate a few areas as examples of key scientific issues and research targets.

1. Science Education

Status

a. Science for Citizens

New programs intended to make scientific expertise available to individuals and public service groups beginning in FY 1977.

b. New Thrusts for Minorities

"Minorities in Science" will encourage minority persons to develop careers in science. "Minority Traineeships" will provide graduate student support in minority schools. "Minority Graduate Centers" will begin planning for six predominantly minority centers for graduate training. "Minority Fellowships", to provide flexible support for graduate training, will be proposed in FY 1978.

c. Research in Science Education

A new applied research program intended to develop knowledge to solve problems in Science Education.

2. Research Applications

a. Earthquake Engineering

Geological sciences are now beginning to deliver capabilities to predict earthquakes. Under a new Presidential initiative, NSF lead agency for earthquake prediction, engineering research, and related public policy.

The program momentum, now realized, must be maintained to produce practical payoffs for society.

b. State Science  
Advisory Mechanisms

NSF has for some time been supporting experiments on different ways of getting science and technology into state and local government practices. It is now appropriate to accelerate the program to achieve the critical mass of effort necessary to get experiments moved into actual practice.

3. Scientific, Technological  
and International Affairs

a. International Science  
and Technology

International science programs (28 bilateral agreements) strengthen science and technology in U.S. and further U.S. policy objectives.

b. Science and Technology  
in Health, Safety and  
the Environment

NSF creating policy and program based upon improved knowledge of

- 1) inadvertant modification of stratosphere,
- 2) earthquake prediction and mitigation, and
- 3) control of air and water pollutants



4. Biological, Behavioral and Social Sciences. Examples of current emphases and areas requiring increased research support include:

a. Physiology, Cellular, Molecular Biology

Basic research in plant cell biology and physiology; structure and interaction of chromosomes and parts of cells; enzyme activity and protein structure; mechanisms of photosynthesis, nitrogen fixation.

b. Behavioral and Neural Sciences

Brain and nervous system development and function; research in memory, thought and reasoning processes, cognitive development and language acquisition in children.

c. Environmental Biology

Structure and function of agricultural, forest, lake and river ecosystems; genetic variability and disease resistance in plants.

d. Social Sciences

Economic research on household consumption and saving behavior; new and improved measurement techniques to analyze inflation, energy, productivity, international economic problems and the quality of life.

5. Astronomical, Atmospheric, Earth, and Ocean Sciences.

a. Climate Index Search

A new thrust is set on organized search and interpretation of modern and historic data in order to identify those variables that best describe the climate. These variables can be used to predict changes in climate which may impact on agriculture and energy conservation.

b. Research on Krill Stocks

This resource, which alone is greater than all the world's existing fisheries, even greater in size, economic return, political implications, and potential total impact than the Mid-East oil fields, is also the keystone in the biological and environmental health of the Antarctic ecosystem.

c. Marine Seismology

Studies of some of the most important problems in geodynamics, studies of sedimentary processes in the oceans, developing a conceptual basis for the evolution of continental slopes and the adjacent ocean floor and for their petroleum resource potential, all require seismic exploration of the ocean basins.

6. Mathematical and Physical Sciences, and Engineering

a. Laser-induced Chemistry

This past year with NIH, a special inter-agency group supporting laser chemistry was convened under NSF leadership. Chemists seek to find if laser radiation can be used to activate specific locations in complex molecules, thereby forming a new and highly localized chemical reaction pathway.

b. Synchrotron Radiation

Use of synchrotron radiation as research tool has expanded so rapidly that present facilities are no longer adequate. Need enhanced National capabilities through upgrading and new facilities.

c. Quarks and other Elementary Particles

A major thrust in the research for elementary particles is conversion of the Cornell synchrotron to include an 8 GeV electron position colliding beam facility.

d. Non-linear Equations

A current target in applied mathematics is the exploitation of mathematical techniques in nonlinear optics, magneto-hydrodynamic waves in a cold plasma, lasers, propagation of long surface and internal gravity waves in the oceans and the atmosphere, as well as other nonlinear wave phenomena.

e. Intelligent Computer Systems

This research is intended to increase our ability to employ computers to assist the human intellect in complex problem-solving situations.

f. Submicron Techniques for Electronic Circuits

Miniaturization to submicron dimensions is the next step for further development in integrated circuits and also for research in other areas of communication systems, such as magnetic memory systems.