

**APPROVED MINUTES<sup>1</sup>  
OPEN SESSION  
360<sup>th</sup> MEETING  
NATIONAL SCIENCE BOARD**

The National Science Foundation  
Arlington, Virginia  
October 19, 2000

Members Present:

Eamon M. Kelly, Chairman  
Anita K. Jones, Vice Chair  
John A. Armstrong  
Nina V. Fedoroff  
Pamela A. Ferguson  
Mary K. Gaillard  
M.R.C. Greenwood  
George M. Langford  
Jane Lubchenco  
Joseph A. Miller, Jr.  
Robert C. Richardson  
Michael G. Rossmann  
Maxine Savitz  
Luis Sequeira  
Daniel Simberloff  
Bob H. Suzuki  
Richard Tapia  
Warren M. Washington  
John A. White, Jr.

Rita R. Colwell, NSF Director

Members Absent:

Stanley V. Jaskolski  
Diana S. Natalicio  
Vera Rubin  
Chang-Lin Tien

Consultant Absent:

Mark S. Wrighton

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<sup>1</sup> The minutes of the 360<sup>th</sup> meeting were approved by the Board at the 361<sup>st</sup> meeting, December 14, 2000.

The National Science Board (NSB) convened in Open Session at 3:10 p.m. on Thursday, October 19, 2000, with Dr. Eamon Kelly, Chairman of the Board, presiding (Agenda NSB-00-174). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

AGENDA ITEM 5: Swearing in of NSB Nominees

Dr. Kelly announced that Board consultant Dr. Mark Wrighton, Chancellor of Washington University in St. Louis, had been welcomed to his first Board meeting but was unable to remain for the Open Session.

Dr. Kelly reported that five additional Board members were confirmed by the Senate: Dr. Nina Fedoroff, Willaman Professor of Life Sciences and Director, Life Sciences Consortium and Biotechnology Institute, The Pennsylvania State University; Dr. Jane Lubchenco, Wayne and Gladys Valley Professor of Marine Biology and Distinguished Professor of Zoology, Oregon State University; Dr. Diana S. Natalicio, President, the University of Texas at El Paso; Dr. Warren M. Washington, Senior Scientist and Section Head, National Center for Atmospheric Research, Boulder; and Dr. John A. White, Jr., Chancellor, University of Arkansas.

Dr. Kelly administered the oath of office to Drs. Fedoroff, Lubchenco, Washington, and White. [Dr. Natalicio was not present.]

AGENDA ITEM 6: Open Session Minutes, August 2000

The Board APPROVED the Open Session minutes of the August 2000 meeting (NSB-00-156, Board Book Tab H).

AGENDA ITEM 7: Closed Session Items for December 2000

The Board APPROVED the Closed Session items for the December 2000 Board Meeting (NSB-00-170, Board Book Tab I).

AGENDA ITEM 8: Chairman's Report

**a. Scientists and Engineers Back in the Schools**

Dr. Kelly thanked Dr. Vera Rubin for her participation in the "Scientists and Engineers Back in the Schools" program, which recently sent eleven distinguished scientists into middle schools to talk about their field of science and do hands-on activities with the students.

**b. Board Member Honors**

Dr. Kelly congratulated Dr. Robert Richardson for being this year's Nobel Laureate speaker at the annual meeting of the Society for the Advancement of Chicanos and

Native Americans in Science, and Dr. Richard Tapia for receiving the Society's award of Distinguished Scientist.

### **c. New Task Forces and Committee Assignments**

Dr. Kelly announced that two new task forces had been established since the last Board meeting. (1) The Task Force on Science and Engineering Infrastructure will report to the Committee on Programs and Plans (CPP) and will be chaired by Dr. White. Members from the Board are Drs. Lubchenko, Anita Jones, Richardson, Rubin, Washington, and Wrighton. Two members of National Science Foundation (NSF) senior staff will also serve on the task force: Dr. Mary Clutter, Assistant Director of Biological Sciences, and Dr. Robert Eisenstein, Assistant Director of Mathematical and Physical Sciences. (2) The Task Force on National Workforce Policies for Science and Engineering will report to the Committee on Education and Human Resources (EHR) and will be chaired by Dr. Joseph Miller, Jr. Members are Drs. Fedoroff, George Langford, Natalicio, Maxine Savitz, Daniel Simberloff, and Chang-Lin Tien.

Dr. Kelly also announced that Dr. Washington has become a member of the Committee on Strategic Science and Engineering Policy Issues (SPI), and Dr. Michael Rossmann has joined the CPP Subcommittee on Polar Issues.

### **d. Congressional Testimony**

Dr. Kelly informed the Board that he had testified before the House Subcommittee on Basic Research, Committee on Science, on October 4 concerning international benchmarking as a tool for allocating Federal research dollars. The hearing focused on the recent benchmarking study by the National Academies' Committee on Science, Engineering and Public Policy. In his statement, Dr. Kelly drew attention to the Board's ongoing work on methodologies for priority setting. He noted that benchmarking, while a valuable tool, must be used with other methods to guide research allocations and that, regrettably, there is no simple, inexpensive solution to allocation issues.

### **e. NSB Meeting and Retreat in February 2001**

With the concurrence of the Executive Committee and Dr. Bob Suzuki, chair of the EHR Committee, Dr. Kelly proposed that the topic of the symposium policy meeting in February 2001 be changed from pre-K-12 education to focus instead on the findings and recommendations of the SPI Committee concerning methodologies for priority setting and allocating scientific investments. The Board agreed to the change.

## AGENDA ITEM 9: Director's Report

### **a. Staff Introductions**

Dr. Rita Colwell, NSF Director, announced recent staff appointments: Dr. Esin Gulari, Director, Division of Chemical and Transport Systems, Engineering Directorate; Dr. Philip Rubin, Director, Division of Behavioral and Cognitive Sciences, Directorate for Social, Behavioral, and Economic Sciences; Mr. Curt Suplee, Director, Office of Legislative and Public Affairs; Mr. Thomas Cooley, Chief Financial Officer and Director of Budget, Finance, and Award Management; and Mr. Robert Hardy, Staff Associate, Office of the Director.

### **b. Financial Management Recognition**

Dr. Colwell reported that, of the 24 agencies covered by the Chief Financial Officers Act of 1990, NSF is one of only three agencies that have complied with the mandatory requirements of the Federal Financial Management Improvement Act of 1996. In recognition of NSF's excellence in presenting its financial affairs to the American taxpayer, NSF received the Association of Government Accountants' Certificate of Excellence in Accountability Reporting Award for FY 1999. In addition, NSF is one of only two agencies to receive the overall grade of "A" from the Congressional Subcommittee on Government Reform for sound financial management and reporting; NSF also received an "A" last year.

### **c. Congressional Update**

Dr. Colwell reported that the House passed the Veterans Administration (VA), Housing and Urban Development (HUD), and Independent Agencies FY 2001 conference report appropriations. The legislation provides \$4.426 billion for NSF, a 13.6 percent increase over FY 2000. This increase is the largest that NSF has ever received, in current or constant dollars. Increases above the FY 2000 levels include research and related activities (\$391.1 million), information technology research (\$125 million), biocomplexity (\$25 million), nanoscale science and engineering initiative (\$53 million), major research instrumentation (\$25 million), major research equipment (\$28 million), education and human resources activities (\$96 million), and salaries and expenses (\$12 million). In addition, NSF will receive approximately \$102 million from the H1-B petitioner account.

## AGENDA ITEM 10: NSF Planning Issues

### **a. Mathematics Initiative**

Dr. Colwell called on Dr. Deborah Lockhart, Cluster Coordinator, Applied Mathematics Program, to present the Mathematics Initiative, scheduled to begin in FY 2002. Dr. Lockhart stated that mathematics and statistics play a crucial role in the development of the U.S. workforce, especially in science and engineering. Recent studies have shown

that only 10 percent of graduate students in mathematics are supported by research assistantships. Forty percent or more is typical in other disciplines. Approximately 55 percent of graduate students in mathematics have teaching assistantships. The median annual NSF award in mathematics varies from \$30,000 to \$35,000, about half the amount in other sciences. NSF proposes a three-pronged initiative: (1) fundamental research on mathematics and statistics to create new discoveries within the discipline and contribute to other areas of science and engineering; (2) connecting the mathematical sciences with other sciences and engineering, focusing on managing and analyzing large data sets, managing and modeling uncertainty, and modeling complex interacting nonlinear systems; and (3) math education, especially embedding collaborations that will alter the way math students and other scientists are trained and change the way they do science throughout their careers. NSF expects to carry out the initiative by increasing grant size and duration, funding collaborations, bringing scientists together in institutes and centers, encouraging cross training, and supporting educational enhancements to research efforts.

In response to questions from Board members, Dr. Lockhart clarified that the initiative will include both pure and applied mathematics, new models, and new algorithms to test the models. The Mathematics Initiative is meant to complement the NSF Workforce Initiative, which will address the issues of diversity, foreign students and faculty in mathematics, and U.S. K-12 education in math and science. In response to Dr. Jones's question regarding the suggested increase in the math stipend, Dr. Colwell indicated that the goal was to double the stipend in the next few years, and increase it by four or five times the current stipend over the long term.

#### **b. NSF Stipends**

Dr. Colwell stated that inadequate graduate student support plays a role in discouraging talented young Americans from pursuing research and education careers in science and engineering. Graduate student stipends are not competitive with today's high-tech salaries; stipends are not even competitive with the average wage of all U.S. workers. The NSF graduate fellowship is \$16,800 per year, before taxes. From their low stipends, students must pay taxes and health care costs. In addition, today's science and engineering graduate students are likely to carry debt from their undergraduate education, and they face longer graduate careers. The financial disincentives disproportionately affect individuals from historically underrepresented groups who may have borrowed larger amounts at the undergraduate level.

Dr. Colwell noted that NSF could play a key role in addressing financial support issues. NSF funds about 25 percent of the 55,000 science and engineering graduate students supported by the Federal government through three mechanisms. (1) NSF graduate research fellowships are awarded to individual students. (2) NSF traineeships are awarded to institutions or departments for distribution to students. (3) NSF research assistantships are awarded to principal investigators for the hiring of graduate assistants, and stipend levels are determined locally. In all three mechanisms, the inclusion of fringe benefits, such as health insurance, is at the discretion of the institution.

In the next decade, employment in all science and engineering fields is expected to increase four times faster than employment for all occupations. Yet, the number of American-born students going into science and engineering is declining, current scientists and engineers are aging, and the number of foreign students choosing to return home is increasing. The Board might want to consider the likely impact of increasing student stipends and institutional support.

*Board discussion:*

Dr. Richardson remarked that the 1986 action making student stipends taxable was not Federal legislation but a ruling by the Internal Revenue Service. A change in that ruling could free up more resources quickly. In response to Board members' questions, Dr. Susan Duby, Director, Division of Graduate Education, stated that most individuals who are offered but decline NSF graduate fellowships accept more lucrative fellowships. The current eligibility criteria for fellowships allow people to change fields or return to graduate school after working. Institutions are allowed to supplement NSF stipends from institutional funds, including funds from other Federal agencies. In response to a question about declining enrollments in mathematics departments, Dr. Philippe Tondeur, Director, Division of Mathematical Sciences, replied that graduate students in mathematics have many alternatives in computer programming at tempting salaries.

Replying to Dr. Suzuki's comment that the nature of the problem extends beyond graduate schools and beyond NSF, Dr. Colwell remarked that NSF should focus on its own fellowships because NSF is a pacesetter. If its stipends go up, other supporters such as the National Institutes of Health will follow. She also stated that it would be helpful to have the Board issue a strong statement and perhaps suggest legislation. Dr. Jones pointed out that universities, not NSF, set the level of research stipends. Universities have a strong interest in the level of NSF stipends. If NSF increases the amount paid to math and science students and their institutions, there will be a domino effect because universities try to maintain a balance between what is paid for research and teaching assistants.

Dr. Kelly closed the discussion by noting that the Executive Committee and the Board will continue to gather information and consider options related to stipend levels.

AGENDA ITEM 11: NSB 50<sup>th</sup> Anniversary Brochure

Dr. Washington, reporting for Dr. Rubin, introduced Ms. Terry Savage, Editorial Director for Low+Associates, who developed the Board's 50<sup>th</sup> anniversary brochure. Ms. Savage explained the proposed layout and design of the brochure.

The Board APPROVED the brochure for release in December, subject to final editorial changes to be approved by the Board Chair in consultation with the chair of the NSB 50<sup>th</sup> Anniversary Task Force.

Dr. Kelly thanked Dr. Rubin and committee members for their excellent work on the brochure.

#### ADENDA ITEM 12: Committee Reports

[The Chairman called for committee, subcommittee, and task force reports in the following order, to accommodate travel schedules.]

##### **a. Committee on Education and Human Resources (EHR)**

Dr. Suzuki, committee chair, reported that the committee heard three presentations. Dr. David Ellis, chair of the Advisory Committee for the EHR Directorate, described the issues usually considered by the Advisory Committee. Dr. William Wulf, president of the National Academy of Engineering, discussed the work of the NAE Committee and Forum on Diversity in the Engineering Workforce, how to make the “business case” for diversity, and ways to leverage existing programs. Ms. Linda Rosen, Executive Director of the Glenn Commission, presented the findings and recommendations in the Commission’s report on mathematics and science teaching entitled *Before It’s Too Late*. The EHR Committee also discussed the presentations at its special joint meeting with the EHR Advisory Committee on October 17.

##### **b. Executive Committee (EC)**

Dr. Colwell, committee chair, reported that at its meeting on September 27, the committee approved the NSF FY 2002 budget submission to the Office of Management and Budget, contingent on the Board’s subsequent review of the readiness for funding of the Major Research Equipment (MRE) projects. The committee also approved the FY 2002 budget submission for the NSF Office of the Inspector General and the revised final version of the NSF Government Performance and Results Act (GPRA) strategic plan.

##### **c. Task Force on International Issues in Science and Engineering (ISE)**

Dr. Pamela Ferguson, in the absence of Dr. Natalicio, reported that the task force approved changes to its draft report for the new Administration, based on comments received from Board members. The task force also discussed the text and recommendations of the draft report providing guidance to NSF. The task force plans to invite Dr. Norman Neureiter, the new Science and Technology Advisor to the Secretary of State, to its December meeting.

Dr. Ferguson presented the task force’s request that the Executive Committee handle final approval of the report for the new Administration before the next Board meeting in December. Reminding the Board that the Executive Committee has authority to act for the Board between meetings, Dr. Kelly stated that the Executive Committee will approve the task force report in November.

#### **d. Audit and Oversight Committee (A&O)**

Dr. Ferguson reported for Dr. Stanley Jaskolski, committee chair. The committee heard reports on the work of the NSF Management Controls Committee, the issuance of NSF Important Notice 126, “NSF’s Paperless Proposal and Award System—Next Steps,” and NSF’s role and responsibilities under P.L. 106-107, the Federal Financial Assistance Management Improvement Act of 1999. The committee received updates on GPRA, Federal research misconduct policy, the preparation of NSF’s annual financial statements and audits of the financial statements and of information systems. The committee also received updates on the process for reviewing the Office of the Inspector General’s *Semiannual Report to the Congress* for the period ending September 30, 2000, and audit plans for this fiscal year.

Dr. Ferguson presented the committee’s request that the Board authorize the Executive Committee to approve the NSF management report and response to the Inspector General’s *Semiannual Report to the Congress*, due in November. Dr. Kelly noted the Board’s concurrence.

#### **e. Committee on Programs and Plans (CPP)**

Dr. John Armstrong, committee chair, reported that the committee considered and unanimously recommended that the Board approve an award to the National High Magnetic Field Laboratory at Florida State University. The committee also recommended that the final three years of support be contingent upon satisfactory progress in the research and development program, management, and leadership of the nuclear magnetic resonance program. The committee reviewed potential MRE projects and judged that five were ready for inclusion in the FY 2002 budget request. The committee received information on the strategy and directions for a leading-edge cyber infrastructure and also on the plans and timeline for the management review of the Association of Universities for Research in Astronomy, Inc. (AURA), which manages the National Optical Astronomical Observatories.

##### *CPP Task Force on Science and Engineering Infrastructure (INF)*

Dr. Richardson reported for Dr. White, chair, that the task force held its first organizational meeting. Members reviewed their broad charge and discussed terms of reference for their work, the elements of a workplan, and a timeline. Dr. White will develop the first draft of a workplan to be refined by the task force before the December meeting.

##### *CPP Subcommittee on Polar Issues (PI)*

Dr. Washington, chair, reported that the subcommittee heard presentations on scientific projects in the Arctic and Antarctic, including models for weather forecasting that could improve safety.



#### **f. EHR Subcommittee and Task Force**

##### *EHR Subcommittee on Science and Engineering Indicators (S&EI)*

Dr. Tapia, chair, reported that the subcommittee approved the 2000/2001 production schedule for *Science and Engineering Indicators—2002*. The subcommittee approved outlines of three chapters and directed Science Resources Studies (SRS) staff to begin drafting the text. The subcommittee intends to have all draft chapters ready for Board review by April 2001. Board approval will be requested at the August 2001 meeting. The subcommittee asked SRS to disaggregate data as much as possible by ethnicity and place of birth, and to provide brief summaries of reviewers' comments and how they will be addressed.

##### *EHR Task Force on National Workforce Policies for Science and Engineering (NWP)*

Dr. Miller, chair, reported that the task force held its inaugural meeting and heard from Dr. Kelly on his expectations. The members then discussed a broad range of issues, including the impact of increased H1-B visas on U.S. students, the teacher workforce, the emphasis on retraining and certificates in addition to academic degrees, and the status of postdoctorates. The task force agreed to deliver a workplan to the EHR Committee in December 2000 and to deliver a report to the Board in November 2001.

#### **g. Task Force on the NSB's 50<sup>th</sup> Anniversary**

Dr. Washington reported for Dr. Rubin that the task force discussed the guest list and program for the December 12 celebratory event, to be held in the Willard Hotel. He also noted that the Board may be able to meet with the President at some point during its December meeting.

#### **h. Committee on Science and Engineering Policy Issues (SPI)**

Dr. Kelly, committee chair, reported that due to delays in the House appropriations process, the scheduled discussion with Appropriations Committee senior staff had to be postponed. The Appropriations Committee has asked to be kept informed of Board studies of methodologies to help improve research allocation decisions. The committee discussed a technical memorandum prepared by SRS staff on economic concepts that underlie the estimation of returns to research and development; the memorandum is background for the October 20 meeting on applications of economic methods to support Federal research allocation decisions. The committee also reviewed a draft agenda for a stakeholders' symposium in early 2001, which will focus on the committee's draft report and discussed ways to maximize its influence on the incoming Administration.

AGENDA ITEM 13: Other Business

Dr. Colwell reported that the Senate had passed the VA, HUD, and Independent Agencies FY 2001 conference report appropriation (S. 8528) about an hour earlier. She thanked the many NSF staff who had worked on the appropriations process.

Dr. Kelly invited the Director's Policy Group to join Board members and guests for a reception at 5:30 p.m. He expressed appreciation to the many NSF staff members who provided support and helped with preparations for the meeting.

Dr. Kelly adjourned the Open Session at 4:55 p.m.

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Janice E. Baker  
Policy Writer/Editor