

**APPROVED MINUTES¹
OPEN SESSION
390TH MEETING
NATIONAL SCIENCE BOARD**

University of Colorado at Boulder
Boulder, Colorado
February 10, 2006

Members Present:

Warren M. Washington, Chairman
Dan E. Arvizu
Barry C. Barish
Steven C. Beering
Ray M. Bowen
Kelvin K. Droegemeier
Kenneth M. Ford
Nina V. Fedoroff
Daniel E. Hastings
Elizabeth Hoffman
Louis J. Lanzerotti
Alan I. Leshner
Douglas D. Randall
Michael G. Rossmann
Daniel Simberloff
Jon C. Strauss
Kathryn D. Sullivan
Jo Anne Vasquez

Arden L. Bement, Jr., *ex officio*

Members Absent:

Diana S. Natalicio, Vice Chair
G. Wayne Clough
Jane Lubchenco.
John A. White, Jr.
Mark S. Wrighton

¹ The minutes of the 390th meeting were approved by the Board at the March 2006 meeting.

The National Science Board (NSB, the Board) convened in Open Session at 10:55 a.m. on Friday, February 10, 2006 with Dr. Warren Washington, Chairman, presiding (Agenda NSB-06-4, Board Book Tab 5). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

Dr. Washington thanked the staff from the University of Colorado, Boulder and the Board Office staff for all their efforts to arrange for the National Center for Atmospheric Research (NCAR) visit, retreat, and Board meeting.

Dr. Washington reported that on February 7, 2006, the Board held its second Workshop on Hurricane Science and Engineering at NCAR. Board events for February 9, 2006 were also held at NCAR and included a series of briefings on the NCAR management structure and diverse programs as well as the annual NSB retreat. The events of February 10, 2006 began with a poster session at the University of Colorado at Boulder where the Board was able to meet and talk with the students who presented their innovative research ideas. Later on February 10, the NSB Hearing on the 21st Century Education in Science, Mathematics, and Technology was held at the university.

Dr. Washington introduced Dr. Philip DiStephano, Chancellor of the University of Colorado at Boulder, to speak. Dr. DiStephano welcomed the Board and stated that the university has always given science a high priority and profile. Dr. DiStephano also stated that NSF has encouraged the value of interdisciplinary education, funding of world-class science, importance of scientific outreach, attraction of minority students into science fields, and application of discovery for the benefit of society. NSF grants on the Boulder campus support improvements in science education and minority and female representation in science in programs, such as the Leadership Education for Advancement and Promotion Program; Colorado Alliance for Graduate Education and Professorship; Integrative Graduate Education and Research Trainingship; Engineering Integrated Teaching and Learning Laboratory; and the Science, Technology, Engineering, Mathematics (STEM) Teacher Preparation Project.

Dr. DiStephano also noted that NSF awards support the education of a significant number of students. Since 2000, the campus received almost \$2 million for the Research Experiences for Undergraduate (REU) programs to support over 300 students. Also since 2000, the campus received \$2.5 million from the NSF to support the Colorado Alliance for Graduate Education and Professorship, which provides assistantships to historically underserved students admitted into science, math, or engineering doctoral programs. Since 1998, the campus received almost \$7 million from the Integrated Graduate Education and Research Trainingship Program to support more than 200 graduate students. Dr. DiStephano affirmed that with NSF support, the University of Colorado at Boulder has the ability to engage scores of students in a wide range of significant research efforts with high quality faculty and researchers.

AGENDA ITEM 6: Approval of Open Session Minutes, November-December 2005

The Board unanimously APPROVED the Open Session minutes of the November-December 2005 Board meeting (NSB-05-166, Board Book Tab 5C).

AGENDA ITEM 7: Closed Session Items for March 2006

The Board unanimously APPROVED the Closed Session items for the March 2006 meeting (NSB-06-8, Board Book Tab 5D).

AGENDA ITEM 8: Chairman's Report

Dr. Washington, NSB Chairman, reported on several issues.

a. Executive Committee Election

Dr. Warren Washington, NSB Chairman, announced that the Board elected Dr. Beering to the Executive Committee to complete a term ending May 2007. The vacancy on the Executive Committee was created by the resignation of Dr. Delores Etter. The Chairman discharged the *ad hoc* Committee on Nominating for NSB Elections for the Executive Committee membership and thanked Dr. Randall, chairman, and Drs. Leshner and Vasquez.

b. *ad hoc* Committee on Nominating for NSB Elections

The Chairman initiated the process for electing Members to the *ad hoc* Committee on Nominating for NSB Elections for Chair, Vice Chair, and two Executive Committee positions. The election of Members to this committee will take place at the March meeting. Dr. Washington invited Members to contact Dr. Crosby concerning interest in serving on this committee.

c. Vannevar Bush 2006 Award Committee

Dr. Washington established the Vannevar Bush 2006 Award Committee to review the nominations received for this prestigious award. The committee will meet in March and recommend a recipient to the full Board at the March meeting.

d. Requests from Congress

Dr. Washington along with Dr. Elizabeth Hoffman, chair of the Education and Human Resources (EHR) Committee, recommended a response to Congressman Bart Gordon's request for the Board to review and provide recommendations on his recently introduced bill, "10,000 Teachers, 10 Million Minds – Science and Math Scholarship Act."

The Board unanimously APPROVED the response to Congressman Gordon's request for the Board to review and provide recommendations on the bill "10,000 Teachers, 10 Million Minds – Science and Math Scholarship Act. (Appendix A)

Dr. Washington also reported on the Board's response to Senator John McCain for the Board to examine existing policies of Federal science agencies concerning the suppression and distortion of research findings, and the impact on quality and credibility of all future Government-sponsored scientific research results. The Board was further requested to develop specific conclusions and recommendations as a result of this examination.

Dr. Washington noted that the Board would be perfectly suited to conduct the examination and to provide recommendations as requested by Senator McCain, and proposed that the Board discuss progress towards development on the draft response at the March meeting, with final approval of the Board response at the May meeting.

To develop a response to Senator McCain, a formal reply will be sent to Senator McCain stating that the request was discussed at the February Board meeting and that the Board will provide him with the results of the examination and recommendations, as requested. The Board will then conduct a review of the organic legislation, executive orders, and public policies for any directions related to the issue of science openness, ensuring the credibility of research results, and insulating research results from suppression or distortion of data from the following agencies: National Aeronautics and Space Administration, National Oceanic and Atmospheric Administration, Fish and Wildlife Service, U.S. Geological Survey, U.S. Department of Agriculture, Environmental Protection Agency, Department of Energy, and Health and Human Services. Dr. Washington will also discuss with the chief scientist of each of these agencies their procedures for preventing suppression or distortion of data and ensuring science openness and credibility of research results to the public.

The Board unanimously CONCURRED with Dr. Washington's proposal to proceed to develop a response to Senator McCain's request for the Board to examine existing policies of Federal science agencies concerning the suppression and distortion of research findings and impact on the quality and credibility of future government sponsored scientific research results, and provide recommendations for strengthening such policies, if warranted.

e. NSB Member Recognition

Dr. Washington acknowledged the accomplishment of Dr. Vasquez, who was awarded the National Science Teachers Association's highest honor: the 2006 Robert H. Carleton Award, which recognizes an individual who has made outstanding contributions to, and provided leadership in, science education at the national level and to their association in particular.

AGENDA ITEM 9: Director's Report

Dr. Arden Bement, NSF Director, reported on the following items.

a. NSB Budget

Dr. Arden Bement, NSF Director, presented an overview of the NSF budget request for FY 2007. On February 6, 2006, the President released NSF's budget request for FY 2007, which included an increase of nearly 8 percent from last year. As part of the President's American Competitiveness Initiative, the Administration made a firm commitment to double the NSF budget over the next 10 years. Dr. Bement stated that the aggressively pursuing new knowledge and the innovation it spurs was NSF's best way to sustain a robust, competitive, and productive America.

The Director reported that for FY 2007, NSF requested 6.02 billion dollars, which was an increase of \$439 million, or 7.9 percent above the FY 2006 level. Specific initiatives highlighted in this request included the following: sensors research for the detection of explosives with particular emphasis on Improvised Explosive Devices (\$20 million), International Polar Year 2007-2008 activities to mark the 50th anniversary of the International Geophysical Year (\$62 million), policy-relevant science metrics (\$6.8 million), and cyberinfrastructure with the acquisition of a leadership class high-performance computing system (\$597 million), and discovery research K-12 to build strong research foundations to foster innovation in K-12 education (\$104 million).

NSF funding by accounts include the Research and Related Activities (R&RA) increase by 7.7 percent, Education and Human Resources by 2.5 percent, Major Research Equipment and Facilities Construction (MREFC) by 26 percent, and Salaries and Expenses (S&E) by 14.2 percent. The increased budget is shared throughout all NSF directorates and research offices. The portfolios in each directorate contribute to the four priorities in this budget request: advancing the frontier through transformational research investments, broadening participation, facilities and infrastructure, and bolstering K-12 education. NSF was also the leading Federal agency in supporting many multi-agency initiatives including the National Science and Technology Council Networking and Information Technology Research and Development (NITRD) Program, the multi-agency National Nanotechnology Initiative (NNI), Climate Change Science Program Homeland Security have also increased. Dr. Bement concluded that with the increased funding in this first year of the doubling process, NSF will be able to capitalize on the many areas of emerging promise already on the horizon. He noted that if MREFC project support is added to the respective budgets of

directorates, whose science will be served by these projects, the funding picture is even more positive.

In response to a question concerning the small increase in Antarctic logistical support, Dr. Bement explained that within the MREFC account funding for the completion of the South Pole Station and upgrade of the aircraft, the total increase is much higher at 19 percent.

b. NSF Strategic Plan

Dr. Kathie Olsen, NSF Deputy Director, presented an update on the development of the NSF Strategic Plan, which is required every 3 years and due to Congress by September 30, 2006. She highlighted the basic requirements on the time period covered by the plan, and stated that the plan date starts the year of the submission and is updated every 3 years. The new Strategic Plan will be labeled as FY 2006 – 2011, but will be revised in FY 2009. NSF would incorporate the *NSB 2020 Vision for the NSF*, adopting the *NSB Vision* strategic priorities as NSF strategic goals. The Strategic Plan mission and vision statements would be consistent with the *NSB Vision*, and the enabling strategies and short-term goals would be incorporated into an additional internally-focused NSF strategic goal and the strategic plan objectives.

The required content of the Strategic Plan would comply with the Government Performance and Results Act, including the agency mission statement, one of more strategic goals, means and strategies for achieving the strategic goals, relationship between annual performance goals and strategic goal, identification of key factors that could affect achievement of strategic goals, description of program evaluation methods, and plans for internal communication of goals and strategies and assignment of accountability for goal achievement. External community involvement would include discussions with advisory committees and chairs, Web survey, and solicited public comments on the draft document. The Strategic Plan draft outline would include the following sections: Investing in America's Future, Vision and Strategic Goals, Allocating Resources, Evaluation Framework, Communicating and Implementing the Plan, and Accountability.

The process has been initiated by requesting comments from NSB, NSF staff, and the public on the existing plan and discussions with congressional staff and the Office of Management and Budget (OMB). A draft plan will be sent to NSB Members for review and comment prior to a detailed discussion in March 2006. A revised draft reflecting that discussion will be distributed to the Board and NSF before the May 2006 NSB meeting, with the expectation that the draft will be cleared by OMB by the end of May to permit public comment on the draft in June 2006. A final draft will be submitted for NSB approval at the August meeting and submitted to OMB for clearance in mid-August 2006 for formal submission to OMB and Congress by September 30, 2006.

c. Congressional Update

Appropriations

The NSF Director reported that on November 22, 2005, the President signed into law the Science, State, Justice, Commerce, and Related Agencies appropriations bill, which contained NSF's 2006 appropriation. The conference report, agreed upon by both chambers, provided NSF with a total of \$5.65 billion, a 3.3 percent increase from last year, minus an across-the-board cut of 0.28 percent for all agencies under the Subcommittee's jurisdiction. Subsequently, Congress enacted a 1 percent across-the-board cut to FY 2006 appropriations. This resulted in a final overall NSF budget of \$5.581 billion. The final total represents a 1.8 percent increase over the FY 2005 budget.

Hearings

Hearings scheduled for February and early March are: February 15, 2006, the House Science Committee's annual hearing on the Federal research and development budget, where Dr. Bement will testify on behalf of NSF; also on February 15, 2006, the Senate Commerce Committee hearing on nanotechnology; and on March 7, 2006, the House Science, State, Justice, Commerce and Related Agencies Appropriations Subcommittee hearing on NSF's budget request.

Dr. Bement noted that there were numerous pending bills relating to science and engineering legislation; however, in the interest of time, he did not report on legislation issues.

d. Antarctic Program

Dr. Kathie Olsen, NSF Deputy Director, accompanied a congressional delegation consisting of three Senators, ten Representatives, and the Undersecretary of the Air Force to inspect the United States Antarctic Program during the first week of January 2006.

e. NSF Staff Announcements

Dr. Bement announced the new Director, Office of International Science and Engineering (OISE), Dr. Thomas Weber, who began his career with NSF in 1987 as Division Director for Advanced Science and Computing. From 1988 to 1995, he was Division Director of Information Systems, Executive Officer for Mathematical and Physical Sciences, and Vision Director for Material Sciences. Dr. Weber received a Ph.D. in Chemical Physics from Johns Hopkins University. Dr. Bement thanked Dr. Kathryn Sullivan for her leadership as Acting Director of OISE during the transition period. The new Acting Division Director for Materials Research, Directorate for Mathematical and Physical Sciences (MPS) is Dr. W. Lance Haworth, who most recently served as the Executive Office.

Dr. Daniel Atkins accepted the position as Director, Office of Cyberinfrastructure (OCI), and would come to NSF from the University of Michigan, Ann Arbor in June 2006. He received his Ph.D. in Computer Science from the University Illinois, Urbana-Champaign.

The Director also reported on the search and interview progress for senior positions with the Office of Legislative and Public Affairs, the Directorate for Mathematical and Physical Sciences, and the Directorate for Engineering.

AGENDA ITEM 10: Committee Reports

a. Education and Human Resources (EHR) Committee

Dr. Elizabeth Hoffman, EHR chair, reported that the committee heard a briefing on the National Science Digital Library (NSDL), by Dr. Kaye Howe, Director of NSDL. NSF established NSDL in 2000 as a free online library that directs users to exemplary resources for STEM education and research. NSDL provides an organized point of access to STEM content that is aggregated from a variety of other digital libraries, NSF-funded projects, and NSDL-reviewed Web sites. NSDL also provides access to services and tools that enhance the use of this content in a variety of contexts. NSDL educational standards are being adopted internationally to facilitate access by teachers and other users to materials best suited for their needs.

Dr. Donald Thompson, Acting Assistant Director of NSF's Education and Human Resources (EHR) Directorate, provided a brief discussion on the evaluation of EHR programs: how EHR evaluates its programs, what works, what does not work, and how EHR assesses program strengths. Dr. Thompson stated that his staff prepared a detailed briefing book for Board Members, which will be mailed to committee members after the February Board meeting. Dr. Hoffman noted that the briefing book would serve as a background for an expanded discussion at the EHR committee meeting in March.

Additionally, the committee discussed areas and topics for future activities, and noted that activities targeted at the February 2005 meeting had been accomplished. The committee focused on the need to take advantage of the historical opportunity presented by the President's State of the Union Address and the bills in both houses of Congress to advance science and mathematics education. The committee also discussed how to ensure that NSF is a prominent partner in these national efforts and discussion. It was especially concerned that a dialog with the Department of Education be undertaken. The committee urged that a strong statement be made on how NSF EHR programs can contribute to the initiatives underway, and underscored the need to present NSF education activities in a way that is coherent and broadly encompassing, rather than as individual projects and programs.

Following the last Commission hearing, scheduled for March 9, 2006 at the University of Southern California in Los Angeles, a teleconference of the EHR Committee would be necessary to develop a proposal on the charge to the Commission to be brought to the March 2006 EHR meeting.

b. Committee on Programs and Plans (CPP)

Before the CPP report, Dr. Washington announced that the following Board Members would not participate in discussions, should they arise, on the following information items to avoid any possible conflicts of interest: Dr. Natalicio on the National High Magnetic Field Laboratory information item; and Drs. Barish, Beering, Bement, Bowen, Hastings, Hoffman, Leshner, Natalicio, Rossmann, and Sullivan on the Large Hadron Collider information item.

Dr. Daniel Simberloff, CPP chairman, reported that the committee heard a status report from the Hurricane Science and Engineering Task Force. Dr. Kelvin Droegemeier reported on two workshops that were held since the last NSB meeting. The third workshop of the task force will be held in Pensacola, Florida in April 2006.

The committee also heard reports by Dr. Michael Turner, Assistant Director, Directorate for Mathematics and Physical Sciences, on two information items. Dr. Turner reported on the plans for the transition from the pre-operations phase to the operations phase for the Large Hadron Collider, which was built on the border between Switzerland and France. To date, about 10 percent of the budget has been U.S., of which NSF funds 15 percent. The remainder of the funding is from the Department of Energy. About 25 percent of the personnel involved in the project are U.S. personnel.

Dr. Turner also reported on a renewal proposal for the National High Magnetic Field Laboratory headed by Florida State University. The renewal proposal decision was made after two major meetings: a National Research Council committee on opportunities in high magnetic field science, which has strongly supported the need for a national laboratory; and an NSF Blue Ribbon Panel, which examined all possible options including recompeting.

Finally, Dr. Bement provided CPP with an update on NSF's cyberinfrastructure (CI) vision statement. NSF planned to provide Chapters 4 and 5 of the document to CPP in draft form by the March 2006 meeting.

AGENDA ITEM: (Unnumbered) *Science and Engineering Indicators 2006*

Dr. Crosby announced that the Board Office received word on February 8, 2006 from the White House that the President signed a letter of transmittal sending a limited number of copies of *Science and Engineering Indicators 2006* to Congress. This action would allow the Board to publicly release *Indicators 2006* and the Companion Piece, *America's Pressing Challenge – Building a Stronger Foundation*. The Board Office scheduled a public press conference on February 23, 2006 in Washington, D.C. for release of these publications.

Dr. Washington adjourned the Open Session at 11:55 a.m.

A handwritten signature in cursive script that reads "Ann A. Ferrante".

Ann A. Ferrante
Writer-Editor
National Science Board Office

Attachment

Appendix A: Letter to Congressman Gordon

National Science Board

February 13, 2006

The Honorable Bart Gordon
House of Representatives
2304 Rayburn House Office Building
Washington, DC 20515

Dear Mr. Gordon:

On behalf of the National Science Board (NSB, the Board), I want to express our appreciation for the strong support of the House Science Committee for the National Science Foundation and for precollege education in science, technology, engineering and mathematics (STEM) fields. We appreciate the opportunity to comment on your recently introduced bill, "10,000 Teachers, 10 Million Minds Science and Math Scholarship Act." Your bill addresses a number of our shared concerns for the future of U.S. leadership in science and technology, which is dependent on a technically and scientifically educated workforce and citizenry.

NSB has issued a number of reports and policy statements over the last decade,ⁱ which have carefully analyzed relevant data and issues and expressed our explicit concerns with regard to the U.S. system for precollege STEM education and the teaching workforce. Many of the Board's recommendations in these issuances are consistent with your proposed legislation and the recent report of the National Academies,ⁱⁱ which serves as the background for your bill. The Board strongly supports the general objectives of the proposed legislation with regard to the precollege STEM teaching workforce.

The critical goal of your bill, which the Board shares, is to attract and retain the best and brightest students and teaching professionals in STEM education. The focus on the quality of STEM precollege teachers is crucial. Therefore we suggest the proposed legislation add language that would:

1. Increase the pool of highly qualified teachers by expanding eligibility for the bill's proposed program to include the best STEM undergraduates and others not currently in the teaching profession, so long as they meet educational requirements to become teachers. Specifically, consideration should be given to increasing flexibility for students and institutions with regard to:
 - eligibility for the proposed masters' programs to include excellent students from academic backgrounds, and especially those majoring in chemistry, physics and mathematics;
 - eligibility for scholarship support for masters' programs that require more than 2 years to complete, especially for teachers and others in the workforce interested in entering the teaching profession who can attend programs only part time;

- eligibility for institutions with high quality science and engineering programs, regardless of whether or not they have schools of education. Many of our Nation's finest liberal arts colleges and science and technology universities do not have colleges of education. Students majoring in science and engineering from these kinds of institutions have higher rates of graduate professional education than the national average. The Board would not want these students to be denied access to the advantages of undergraduate and graduate professional education in K-12 education envisioned in this bill.
2. Ensure the high quality of the STEM education programs offered by institutions, especially by assessing outcomes with respect to STEM K-12 student performance;
 3. Ensure scholarship students receive high quality professional development and mentoring as part of the program by setting clear, practical standards for institutions;
 4. Provide incentives to scholarship recipients on graduation and teachers already in the labor force to work in the schools that are neediest with respect to shortages of qualified science and mathematics teachers and encourage them to remain in those schools.

We further applaud your bill for providing professional development programs for teachers, especially federally funded summer institute programs. We encourage efforts and incentives to increase investment and participation by other sectors in improving the quality of the STEM workforce.

Again, we appreciate the opportunity to offer our comments on this important bill. I would be happy to meet with you and your staff personally to discuss this matter.

Sincerely,



Warren M. Washington
Chairman

ⁱ National Science Board, *Preparing Our Children* (NSB-99-31); *Failing Our Children* (NSB-98-154), *The Science and Engineering Workforce – Realizing America’s Potential* (NSB-03-69); Letter to Stanley Litow, President, IBM Foundation, 2005; *America’s Pressing Challenge—Building A Stronger Foundation* (NSB-06-02) (to be released with *Science and Engineering Indicators 2006*).

ⁱⁱ National Academies, *Rising Above the Gathering Storm/Energizing and Employing America for a Brighter Economic Future* (2005).