

**APPROVED MINUTES<sup>1</sup>  
OPEN SESSION  
392ND MEETING  
NATIONAL SCIENCE BOARD**

The National Science Foundation  
Arlington, Virginia  
May 9-10, 2006

Members Present:

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

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

Members Absent:

Diana S. Natalicio, Vice Chairman  
G. Wayne Clough  
Michael G. Rossmann  
Mark S. Wrighton

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<sup>1</sup> The minutes of the 392<sup>nd</sup> meeting were approved by the Board at the August 2006 meeting.

The National Science Board (Board) convened in Open Session at 2:10 p.m. on Wednesday, May 10, 2006 with Dr. Warren Washington, Chairman, presiding (Agenda NSB-06-46, Board Book Tab 13). In accordance with the Government in the Sunshine Act, this portion of the meeting was open to the public.

Before beginning the meeting, Dr. Washington recognized Board Members of the Class of 2006, who completed their service with the May 2006 Board meeting. The following Members served for the past 6 years: Drs. Nina Fedoroff, Michael Rossmann, Daniel Simberloff, and Mark Wrighton. Dr. Jane Lubchenco served for 10 years, and Drs. John White, Diana Natalicio, and Dr. Washington served for 12 years on the Board. Dr. Washington thanked the Class of 2006 for their dedication and willingness to work with complex policy issues that the Board addressed during their terms.

AGENDA ITEM 7: Approval of Open Session Minutes, March 2006

The Board unanimously APPROVED the Open Session minutes of the March 2006 Board meeting (NSB-06-44, Board Book Tab 13G).

AGENDA ITEM 8: Closed Session Items for August 2006

The Board unanimously APPROVED the Closed Session items for the August 2006 meeting (NSB-06-50, Board Book Tab 13H).

AGENDA ITEM 9: Chairman's Report

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

**a. Results of Board Elections**

Dr. Washington announced that the Board elected Dr. Steven Beering, as Chairman, and Dr. Kathryn Sullivan, as Vice Chairman for the 2006-2008 terms. Both were also elected as members of the Executive Committee from 2006 to 2008. Dr. Ray Bowen was elected to the Executive Committee to complete the unexpired term (May 2006 – May 2007) created by Dr. Beering's election as Board Chairman.

**b. Board Meeting Calendar for 2007**

As part of the annual business conducted each May, the Board reviewed the draft meeting schedule for the next calendar year. Board Members were polled to ensure attendance by the highest number of voting Members possible. The draft meeting calendar and memo was provided to Board Members for final review (NSB-06-54, Board Book Tab 13I).

The Board unanimously APPROVED the Board meeting calendar for 2007 (NSB-06-65) (Appendix A).

The Chairman asked Dr. Crosby, Executive Officer of the Board, to develop a short list of candidate locations for the annual retreat and site visit next year. He asked Dr. Crosby to present the list at the August 2006 Board meeting.

**c. Response to Senator McCain**

Dr. Washington presented a draft formal response to Senator John McCain on 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. He thanked Drs. G. Wayne Clough, Louis Lanzerotti, and Alan Leshner who helped write the letter and other Board Members who made comments and improvements to the response. Dr. Lubchenco suggested modifications to the letter, which were discussed and accepted by the Board.

The Board unanimously APPROVED the final formal response to Senator John McCain on 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 (Appendix B).

The Board agreed that, following delivery of the letters to Senator McCain, the response should be noted on the Board Web site along with Senator McCain's request, if agreeable by the Senator.

**d. Annual Awards Dinner**

The Board held its annual Awards Dinner at the Smithsonian Institution's Museum of Natural History on May 9, 2006. The Board was honored to receive a message from President Bush, and recognized the outgoing Chairman of the House Science Committee, Sherwood Boehlert, in appreciation of his valuable contributions to the science and education communities.

The following award recipients were recognized for their distinguished contributions:

- Dr. Raj Reddy, Mozah Bint Nasser University Professor of Computer Science and Robotics, School of Computer Science, Carnegie Mellon University received the Vannevar Bush Award for his pioneering research in robotics and intelligent systems and contributions in the formation of national information and telecommunications policy.
- Dr. Charles H. Townes, Professor in the Graduate School, University of California, Berkeley also received the Vannevar Bush Award for notable scientific discoveries and research in the fields of quantum electronics and astrophysics, and distinguished public service influencing Federal policies on science and technology issues.

- Dr. Emmanuel J. Candes, Professor of Applied and Computational Mathematics, California Institute of Technology received the Alan T. Waterman Award for fundamental research in computational mathematics and statistical estimation with applications to signal compression and image processing.
- Mr. Alan Alda, Host of *Scientific American Frontiers* and an actor, writer, and director received the individual NSB Public Service Award for fostering wonder and discovery by bringing complex scientific concepts to all audiences through television and the dramatic arts.
- Dr. Craig R. Barrett, Chairman of the Board for Intel Corporation also received the individual NSB Public Service Award for outstanding promotion of science education, dedicated commitment to the public's understanding of science, and positive influence on science and technology policy.
- Association of Science-Technology Centers received the group NSB Public Service Award for excellence and innovation in informal science education to advance public understanding of science among diverse audiences worldwide.

On behalf of the Board, the Chairman thanked Ms. Susan Fannoney, Ms. Ann Noonan, and other staff responsible for the planning of the Awards Dinner.

#### **e. Congressional Testimony**

Dr. Washington, in his last statement to Congress as Chairman of the Board, testified before the Committee on Commerce, Science, and Transportation; Subcommittee on Science and Space on May 2, 2006. In his statement, Dr. Washington discussed the NSF budget request for FY 2007, the Board's budget for FY 2007, and the Board activities during the last year. The testimony was included in supplemental materials (Board Book Tab 13) provided to Board Members.

#### **f. Board Commission on 21<sup>st</sup> Century Education in STEM**

The Chairman announced the members of the Commission on 21<sup>st</sup> Century Education in Science, Technology, Engineering, and Mathematics (STEM). As described in the Commission charge (supplemental Board Book Tab 13), Dr. Washington, working closely with Dr. Beering and in consultation with the Board, the Administration, and various stakeholder groups, finalized decisions on Commissioner appointments. Two vacant positions, one being a co-chairman, would be selected by the incoming Board Chairman (NSB/STEMComm-06-1) (Appendix C).

The Board Office will provide a draft set of Summary Notes from the three public meetings held December 2005, February 2006, and March 2006 to Commission members; the Honorable Frank Wolf, Chairman of the Subcommittee on Science, State, Justice, and Commerce and Related Agencies; as well as other Members of Congress with an interest in this matter.

#### **g. Committee Announcements**

Dr. Washington discharged the *ad hoc* Committee for the Vannevar Bush Award with thanks to Dr. Kenneth Ford, chairman, and Drs. Dan Arvizu, Kelvin Droegemeier, and Kathryn Sullivan. Also discharged was the *ad hoc* Committee on Nominating for NSB Elections with thanks to Dr. White, chairman, and Drs. Lubchenco, Simberloff, and Wrighton. Lastly, the Chairman deferred the appointment of members to serve on the *ad hoc* Committee on NSB Nominations for the Class of 2008 – 2014 to the new Board Chairman.

#### **h. Staff Recognition**

The Chairman recognized Ms. Amanda Slocum, Science Assistant for the Board, who completed her appointment. She served as Executive Secretary for the Task Group on International Science and Engineering and assisted with the Task Force on Transformative Research. Ms. Slocum will be working towards her Ph.D. degree at Carnegie Mellon University.

#### **i. Parting Words**

Dr. Washington stated that it had been an honor to serve on the Board to advance the research of the National Science Foundation. He further stated that it had been a privilege to work with Dr. Rita Colwell, former NSF Director; Dr. Joseph Bordogna, former NSF Deputy Director; Dr. Arden Bement, NSF Director; and Dr. Kathie Olsen, NSF Deputy Director who had done an excellent job of managing the National Science Foundation. He thanked Dr. Crosby and the Board Office staff for their outstanding contributions. Lastly, Dr. Washington thanked his wife, Mary, for all her support.

#### **AGENDA ITEM 10: Director's Report**

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

##### **a. NSF Staff Announcement**

Dr. Bement introduced Dr. Julie D. Morris, Director of the Division of Ocean Science, Directorate for Geosciences (GEO) as of April 24, 2006 under an Inter-governmental Personnel Act (IPA) assignment between NSF and Washington University, St. Louis, where she serves as Research Associate Professor. She received her Ph.D. in 1984 from the Massachusetts Institute of Technology.

## **b. NSF Awarded “Webby” People’s Voice Award**

The NSF Web site won the People's Voice Award in the "Government" category of the 10<sup>th</sup> Annual “Webby” Award competition, which is regarded as the "Oscar" contest for Web sites. NSF was selected as one of five finalists worldwide competing against the National Aeronautics and Space Administration’s JPL site, the city of San Francisco, as well as entries from Australia and England. The NSF Web site was selected by the “People’s Voice” process, determined by the public through on-line voting, instead of a juried competition. Dr. Bement recognized the extraordinary work by NSF’s Office of Legislative and Public Affairs (OLPA) and Administrative Services (DAS). He called on Mr. Curtis Suplee, OLPA Director, who helped lead the effort, who acknowledged the contributions of the Webby Implementation Group comprised of the Web masters of different directorates and the Web Advisory Group.

## **c. Congressional Update**

A congressional update, which listed numerous hearings and legislation relating to NSF, was submitted for the record (Board Book Tab 13J) (Appendix D).

### AGENDA ITEM 11: Committee Reports

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

Dr. Washington reported for Dr. Bement, EC chairman. The committee recommended that the Board accept the 2005 Annual Report of the Executive Committee, covering the period from May 2005 to April 2006. He noted that during this period, EC took no actions on behalf of the Board (Board Book Tab 13K).

The Board unanimously ACCEPTED the 2005 Annual Report of the Executive Committee (NSB/EC/06-3).

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

Dr. Beering reported for Dr. Mark Wrighton, A&O chairman and stated that the NSF Office of Inspector General presented the *Semiannual Report to the Congress, March 2006, Office of the Inspector General*. Dr. Fae Korsmo, NSF Director’s Office, relayed the management response with data tables. The committee approved the draft transmittal letter and management response (Board Book Tab 7B). Based on this recommendation by the A&O Committee:

The Board unanimously APPROVED the transmittal letter and management response to the Semiannual Report to the Congress, March 2006, Office of the Inspector General.

Mr. Thomas Cooley, NSF Chief Financial Officer, provided an update on the status of the reportable conditions under the FY 2005 financial statement audit, oversight of large facilities, and agency efforts to implement the Office of Management and Budget (OMB) Circular A-123,

“Management's Responsibility for Internal Control.” He also noted that a larger number of “high risk” institutions were identified for FY 2006 than FY 2005, and that contractor help will assure NSF oversight coverage of all designated high risk institutions. Mr. Cooley further stated that the Defense Contract Audit Agency (DCAA) had been engaged by NSF to help with cost reviews of large contracts. He stated that NSF was making progress with its implementation of Circular A-123 and that information on the A-123 implementation will be provided at the August 2006 meeting.

### **c. Education and Human Resources (EHR) Committee**

Dr. Elizabeth Hoffman, EHR chairman, reported that the committee was briefed by Dr. Michael S. Teitelbaum, Vice President of the Alfred P. Sloan Foundation in New York, and Dr. Carol Lynch, Senior Scholar at the Council of Graduate Schools (CGS). Drs. Teitelbaum and Lynch provided background on the Sloan Science Master's Program and the partnership with CGS in the Professional Science Master's Degree Program. This program is a professional MS degree in science or mathematics for students interested in a wider variety of career options than provided by current graduate programs in science and mathematics. The program is designed to fill a gap by developing individuals with both technical and business skills. Committee members agreed that individuals having both sets of skills fill an important and growing need, and that further discussion on this topic is needed.

Dr. Donald Thompson, Acting Assistant Director, NSF Education and Human Resources Directorate (NSF/EHR), continued with the series of presentations to the committee on the unique role of NSF in STEM education and the evaluation of NSF's education investments. The committee discussed the assessments of the Math and Science Partnership (MPS) Program and the Integrative Graduate Education and Research Traineeship (IGERT) Program. Data from the first year of the partnership program showed that MPS schools had significant improvements in mathematics proficiency test scores, while MPS elementary school students had significant gains in science proficiency in the 2000-2004 school years. High school mathematics students showed the greatest improvement in proficiency. The IGERT study found that the program has had a measurable impact in altering the graduate educational experiences of participating students, supporting faculty engagement in interdisciplinary teaching and research, and advancing interdisciplinary graduate education within host institutions. Dr. Thompson noted that the various EHR programs are at different stages of evaluation, and as further information becomes available, he will share it with the committee.

Dr. Hoffman called on Dr. Daniel Hastings to report on the EHR Committee's Engineering Education Workshop activity led by the *ad hoc* group composed of Drs. G. Wayne Clough, Louis Lanzerotti, and Hastings. Dr. Hastings reported that the *ad hoc* group plans to hold discussions with the NSF Engineering Directorate leadership and the President of the National Academy of Engineers, and then move forward with plans for a workshop on November 7, 2006 at the Georgia Institute of Technology with leading deans of engineering institutions to address issues that emerged from the Massachusetts Institute of Technology (MIT) workshop October 20, 2005. The *ad hoc* group will then prepare a draft report on both workshops for the Board.

Dr. Hoffman stated that Dr. Crosby reported to the committee on Department of Defense (DoD) activities and concerns with respect to the U.S. workforce. DoD, which employs over 40 percent of all Federal scientists and engineers, and two-thirds of all Federal engineers, has programs to increase the number of scientists and engineers in the workforce areas that DoD needs. The committee agreed that it would be of mutual interest to have Dr. William Berry, Deputy Under Secretary of the Defense Laboratories and Basic Sciences, as an invited speaker at a future EHR meeting.

Dr. Hoffman further reported that Dr. Sullivan introduced a new publication, *Science Can Take Her Places! A Guide for Parents Grades 4-7 for Encouraging Your Daughter's Interests in Science, Math and Technology*, published by Sally Ride Science. The material is based upon work supported by NSF. Drs. Sullivan and Hoffman would attend the First National Summit on the Advancement of Girls in Math and Science held at the U.S. Department of Education later in the month. Dr. Kathie Olsen, NSF Deputy Director, and Dr. Jo Anne Vasquez would also be participants.

#### **d. EHR Subcommittee on Science and Engineering Indicators (SEI)**

Dr. Beering, SEI chairman, thanked the NSF Division of Science Resource Statistics (SRS) staff and the Board Office staff for their extraordinary efforts in producing *Science and Engineering Indicators 2006* (NSB-06-1). He also noted with gratitude Dr. Michael Rossmann's contribution and Dr. John White who worked on the past six *Indicator* editions.

Dr. Beering reported that he and Dr. Vasquez had accepted several invitations from outside groups to speak about *Indicators 2006* and the Companion Piece, *America's Pressing Challenge -- Building a Stronger Foundation* (NSB-06-2). The most notable speaking invitation was for April 6, 2006 where they addressed a well-attended joint meeting of the congressional research and development and STEM caucuses. Dr. Vasquez attended the national meeting of the National Science Teachers Association (NSTA) in Anaheim, California, where she also made several presentations on *Indicators* and received the prestigious Robert H. Carlton Award for national leadership in the field of science education, NSTA's highest award.

The subcommittee heard and discussed a Board Office staff presentation, by Ms. Jean Pomeroy, on the schedule and possible formats for the "Digest" or condensed form of *Indicators 2008*. The committee preferred a simpler format and agreed to hold discussions on how to include policy information as well as offering an electronic version at future meetings. Mr. John Gawalt, SRS staff, gave a brief presentation on the dissemination process for *Indicators 2006* for print and electronic versions. Strategies for the dissemination of *Indicators 2006* and dissemination of future *Indicators* will be discussed at the August 2006 meeting.

Dr. Beering thanked the NSF and Board staffs for all their efforts to produce *Indicators 2006*. Thousands of copies were being circulated and increasing numbers of requests were taken for the publication's wider distribution.



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

Dr. Daniel Simberloff, CPP chairman, reported on the status of several task forces and a subcommittee.

Dr. Fedoroff, chairman of the Task Force on Transformative Research (TR), reported on the upcoming Board-sponsored workshop on May 16, 2006 at NSF that would focus on transformative research perspectives from non-governmental organizations, including industry and private foundations. An initial draft report is scheduled for delivery to CPP in August 2006. Although Dr. Fedoroff's term on the Board comes to an end, she expressed her willingness to remain involved in the compilation and review leading to the final report.

Dr. Douglas Randall will take over as chairman of the task force.

Dr. Jon Strauss, chairman of the Task Force on International Science (INT), reported on the Board-sponsored Hearing and Roundtable Discussion on International Science Partnerships, to be held on May 11, 2006 in Washington, DC at George Washington University. The task force is developing two additional roundtables for international locations.

Dr. Kelvin Droegemeier, co-chairman of the Task Force on Hurricane Science and Engineering (HSE), reported that all HSE workshops were completed and that a draft of the report with recommendations was expected to go to the Board in late June 2006. Further discussion on the report is planned by mail or teleconference before the August 2006 Board meeting, with the hope that a draft report can be available for public comment in September 2006.

Dr. John White, chairman of the Subcommittee on Polar Issues (SOPI), reported that Dr. Karl Erb, Director of the Office of Polar Programs (OPP), presented a brief overview of the status of the International Polar Year (IPY) competition, which resulted in 150 proposals by the target date. Those requests totaled about \$150 million, about a third for education and outreach. Mr. Simon Stephenson, Section Head for the OPP Arctic Sciences Section, reported on IPY planning for an Arctic Observing Network (AON) designed to study the Arctic as a system. Sixty-six proposals representing 42 projects, had been submitted to the IPY on this item and about \$20 million dollars will be available for AON in FY 2007. Mr. Stephenson also discussed progress towards integrating European and U.S. AON activities, and summarized recommendations of the National Academy of Sciences Polar Research Board's study of the AON. Dr. Polly Penhale, OPP Environmental Officer, provided a brief overview on efforts to control the introduction of non-native species in Antarctica including a recent workshop on this topic in New Zealand. Lastly, two Board Members, Drs. Ford and Vasquez, who recently traveled to Antarctica, summarized their experiences.

The committee then continued with discussion items. The first topic was NSF policies and processes used to determine competition, recompetition, and renewal of NSF awards. Current Board policy is for recompetition to occur, unless it is judged to be in the best interest of U.S. science and engineering not to be recompeted. The discussion focused on the exact interpretation of the best interests of U.S. science and engineering. Mr. Cooley provided some

context for how the Board policy originated. The Board Office was requested to compile a history of the development of the current policy, and Dr. Lanzerotti volunteered to review the history and past documents and report at the next CPP meeting in August 2006.

The second discussion item concerned NSF items requiring Board review. Current Board policy provides conditions that trigger a Board review. The discussion focused on new NSF programs and how to distinguish a new program from a reorganization that carries over part of a previous program. CPP plans to clarify this issue at a later meeting.

The first information item presented to the committee, an update on the status of planning for NSF's role in the renewal of the National Academic Research Fleet, was given by Dr. Margaret Leinen, Assistant Director, Directorate for Geosciences (GEO). The fleet is aging and has many vessels that are about 30 years old, basically their useful lifetime. The Alaska Region Research Vessel (ARRV) is one component of the fleet renewal. Funds for AARV were requested in the FY 2007 budget request currently under consideration by Congress. GEO plans to issue a solicitation for the ship construction and for the ship operator. This vessel would be a major contribution to the objectives of the IPY. A second component of the fleet involves Regional Class Research Vessels. Two design competition contracts were selected in April 2005 and September 2006, and NSF expects to release a solicitation for operations. The ships will support coastal-scale science activities. GEO anticipates requesting Board approval for research and related activities funding, not to exceed \$50 million in any 1 year over a 6-year period. A third component of the fleet renewal activities is the Research Vessel *Langseth*, which is a 3-dimensional seismic vessel replacing the retired Research Vessel, *Ewing*. It is currently undergoing modification and should be in service in late 2006. The final component of the fleet renewal is a Human Occupied Vehicle that will replace the Deep Submergence Vehicle, *Alvin*.

The second information item was on the Major Research Equipment and Facilities Construction (MREFC) horizon project – the Global Environment for networking Innovations (GENI) – presented by Dr. Peter Freeman, Assistant Director, Directorate for Computer and Information Sciences and Engineering. GENI is an advanced flexible programmable instrument for network and distributed systems research. GENI will allow greatly increased experimentation with complex systems to provide a deeper understanding of their dynamics, evaluation of alternative network architectures, and an exploration of different services. There are a number of fundamental issues with current internet architecture and mechanisms that cannot be fixed incrementally. GENI will provide the opportunities to develop new architectures. Dr. Freeman also discussed some partnership explorations underway with industry, government, and international entities.

The draft *NSF Facility Plan 2006* was provided to the Board on May 8, 2006 for review. Mr. Cooley, who gave an overview of the plan, noting that the plan is dictated annually as part of the *Joint NSB-NSF Management Report: Setting Priorities for Large Research Facilities Supported by National Science Foundation (NSB-05-77)* report. Changes to the 2006 plan include: the addition of Advanced Technology Solar Telescope (ATST) to the Readiness Stage List, and the removal of the Horizon List to avoid conferring the special status on projects that

may or may not come to fruition. The committee felt strongly that the Horizon List should remain part of the annual *Facility Plan*. The consensus of the committee was that language could be crafted to allay the NSF's concerns that Horizon projects might be erroneously viewed as "guaranteed" for funding. Mr. Cooley suggested that the Horizon List could be included in an appendix. NSF also suggested that the Board consider moving the release of the annual *Facility Plan* to February to coordinate with the NSF budget release for maximum impact on the budget. The *Facility Plan* would be discussed again at the August 2006 meeting.

Lastly, CPP deferred consideration of the revised Chapter 5 of the Cyberinfrastructure Vision document. Dr. Deborah Crawford, Acting Director, Office of Cyberinfrastructure, indicated that a revised draft would be available in about a month with the revisions suggested at the March 2006 Board meeting.

#### **f. Committee on Strategy and Budget (CSB)**

Dr. Ray Bowen, CSB chairman, reported that the committee heard a briefing from Mr. Lawrence Rudolph, NSF General Counsel, on Title IX and its impacts on NSF. The committee asked to be kept informed on the evolution of Title IX compliance procedures relating to NSF. The committee learned that NSF is assuming responsibility for Title IX compliance audits and asked to be kept informed on this subject as it related to NSF.

Dr. Joanne Tornow, chairman of the newly created NSF Working Group on the Impact of Proposal and Award Management Mechanisms, briefed CSB as part of the continuing discussions on the topics of award size, duration and success rates. The purpose of this briefing was to discuss the plans of the working group and discuss directorate level strategies used to balance success rates versus award size and duration. The committee expressed interest in being briefed on the activities of this working group during the approximate 1 year assignment. In the meantime, the current Board guidance on award size, duration, and success rate remains unchanged.

The committee reviewed the initial draft *NSF Strategic Plan FY 2006 – FY 2011*, which requires Board approval in August 2006 to be submitted to OMB in September 2006. The committee expressed support for the draft with suggested minor changes to specific areas. The committee also supported NSF's plan to make the draft *Strategic Plan* available for public comment during June-July 2006.

Mr. Cooley also briefed the committee on the Long Range Plan overview that included an update on the membership of key congressional committees that maintain oversight of NSF. He pointed out that this document had been created in the same format for about 20 years and it contains a wealth of information about NSF and its activities.

Before the close of the meeting, Dr. Beering stated that he deeply appreciated the Board's confidence in electing him to succeed Dr. Washington as Board Chairman. He noted that Dr. Washington's efforts resulted in many milestones and great accomplishments for the Board and NSF, and presented Dr. Washington with a gift of a commemorative gavel. Dr. Beering then presented Board Members of the Class of 2006 with Board paperweights produced for the occasion.

Dr. Washington adjourned the Open Session at 3:15 p.m.



Ann A. Ferrante  
Writer-Editor  
National Science Board Office

#### Attachments

Appendix A: [NSB-06-65](#)

Calendar of Meetings, National Science Board, 2007

Appendix B: Response to Senator McCain

Appendix C: [NSB/STEMComm-06-1](#)

Members, Commission on 21<sup>st</sup> Century Education STEM

Appendix D: Director's NSF Congressional Update

**CALENDAR OF MEETINGS  
NATIONAL SCIENCE BOARD<sup>2</sup>**

**2007**

February 7 – 8  
(Wednesday – Thursday)  
[Annual Retreat/Site Visit]

March 29-30  
(Thursday – Friday)

May 14 – 15  
(Monday – Tuesday)  
[Annual Meeting and Awards Dinner]

August 7 – 8  
(Tuesday – Wednesday)

October 2 3  
(Tuesday – Wednesday)

December 5 – 6  
(Wednesday – Thursday)

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<sup>2</sup> Approved at the May 10, 2006 National Science Board meeting.

The Honorable John McCain  
United States Senate  
Washington, D.C. 20510-0001

Dear Senator McCain:

Your February 8, 2006 letter requested that the National Science Board (the Board) examine existing policies of Federal science agencies concerning the suppression and distortion of research findings and the impact these actions could have on the quality and credibility of future Government-sponsored scientific research results. As indicated in my initial February 17, 2006 letter of response to you, the Board has reviewed statutes, regulations, agency statements and internal documents related to this issue for the Environmental Protection Agency (EPA), the Fish and Wildlife Service (FWS), the National Aeronautics and Space Administration (NASA), the National Institutes of Health (NIH), the National Oceanic and Atmospheric Administration (NOAA), the U.S. Geological Survey (USGS), and the Departments of Agriculture (USDA), Energy (DOE), and Health and Human Services (HHS). In addition, the Board requested that the Inspector General (IG) of the National Science Foundation (NSF) poll her counterparts at these agencies for additional relevant information.

The Board would like to acknowledge and thank EPA, NASA, NIH, NOAA, USGS, USDA, and DOE for their responses to our request for information. It is readily apparent from our positive interactions with these agencies that they believe it is important that agency research results be credible and objective. Many are also actively taking steps to re-examine their existing rules and procedures regarding communication of agency research results.

The findings of the Board's current review in response to your specific request, as well as background information and recommendations that the Board respectfully submits for consideration by relevant bodies of the Federal Government, are provided below.

#### OVERALL CONCLUSION

*Upon review as per your request, the Board finds that there exists no consistent Federal policy regarding the dissemination of research results by Federal employees. An overarching set of principles for the communication of scientific information by Government scientists, policy makers, and managers should be developed and issued by the Administration to serve as the umbrella under which each agency would develop its specific policies and procedures. The Board believes a need exists for all Federal agencies that conduct research to establish policies and procedures to encourage open exchange of data and results of research conducted by agency scientists, while preventing the intentional or unintentional suppression or distortion of research findings and accommodating appropriate agency review. A clear distinction should be made between communicating professional research results and data versus the interpretation of data and results in a context that seeks to influence, through the injection of personal viewpoints, public opinion or the formulation of public policy. Delay in taking these actions may contribute to a potential loss of confidence by the American public and broader research community regarding the quality and credibility of Government sponsored scientific research results.*

## BACKGROUND

The National Science Board last studied the issue of scientific openness in 1988.<sup>1</sup> We continue to stand by the fundamentals we articulated in 1988 “[t]hat maintaining openness generally has a superior social claim over other objectives deriving from economics or national security. Restrictions on openness should be approached as exceptions rather than norms. Any restrictions Government or other institutions impose on the free flow of information must meet high standards of proof of their necessity.”<sup>3</sup>

The utilization of science in the creation of public policy is not part of the review that the Board has conducted. Rather our review is focused on the policies and procedures that Federal science agencies have in place to prevent the suppression and/or distortion of research findings of agency scientists. The question of when and how science is used to inform and serve as a foundation for public policy has been raised and discussed by others for years, extending over many Administrations and Congresses. The Board firmly believes that public policy should be based on the best available knowledge provided through objective science. The Board also recognizes that scientific understanding is one of a number of factors that are considered in developing public policy.

The Board believes it is imperative that results and data from research conducted by Federal employees be of the highest quality and openly communicated to the public in an unencumbered manner (with appropriate consideration of national security issues). The American public must have confidence that scientific information they receive from the Federal Government has not been suppressed or distorted. An informed and educated public can then develop its own interpretations and conclusions for how public policy should be shaped based on the objective results of science combined with other societal values, realities and desires.

## METHODS

Information for this rapid Board review was obtained through inquiries to agency heads or chief scientists, conversations with agency officials, searches of agency websites, as well as searches of proprietary legal and news databases. We limited our review to the release and dissemination of unclassified research results. This analysis did not address an individual agency’s rulemaking or policy development process.

In gathering information and conducting our review, the Board focused on policies and procedures for research conducted by Federal agencies, as opposed to research funded by agencies but conducted by the external science community. For example, NSF provides significant support for conducting research through over 13,000 grants that are awarded annually to the external research community through a rigorous merit review system. While NSF does not actually conduct research itself, it does have in place Board-approved policies encouraging principal investigators of NSF awards to freely disseminate and share their data and research

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<sup>1</sup> National Science Board, *Report of the NSB Committee on Openness of Scientific Communications*, (1988) (NSB-88-215) <http://www.nsf.gov/nsb/documents/1988/openness.pdf>

<sup>3</sup> Id at 1.

results. Most other Federal science agencies also have mechanisms for providing support for extramural research to be conducted in a similar fashion as NSF, while also directly employing scientists to conduct and interpret research for the Government. Agency policies related to data release and communication of research results, and an agency's options for administrative actions for deviations from the policy, would differ between grantees and an agency's employees.

### FINDINGS

Congressional aspirations for public access to the Federal agencies' scientific information is frequently reflected in statutory language, which generally requires<sup>4</sup> or permits<sup>5</sup> the generation, dissemination, and publication of the agencies' research results and information.<sup>6</sup> We are only aware of one situation, involving agencies in the process of applying for Government-owned patents, where statutory language authorizes Federal agencies to withhold unclassified technical findings from public disclosure, and then only for a "reasonable" amount of time.<sup>7</sup> We found only a few relevant Federal regulations for the disclosure of research findings, which generally encourage publication of research results.<sup>8</sup>

The Board found that the dissemination policies and practices of the agencies surveyed are inconsistent across the Government. NASA Administrator Michael Griffin, for example, recently issued an agency-wide notice of revised policies for the release of scientific and technical information, clearly stating what public affairs officers can and cannot do regarding such releases, describing the distinction between professional scientific conclusions and personal or policy opinions beyond an employee's work scope, establishing a dispute resolution process, and outlining responsibilities of the communications process. These policies, a "facts sheet", and three agency-wide e-mail messages provide NASA employees with clear explanations and relevant examples about what is and is not permitted or recommended.

NASA's clear agency-wide articulation of policy and a somewhat similar (albeit to a less comprehensive degree) recent agency-wide communication from NOAA Administrator, Conrad Lautenbacher, are in stark contrast to several of the other agencies, where the specifics of public dissemination of scientific research results by employees are determined by field or regional offices. Headquarters officials at those agencies indicated to us that it would be a difficult and time-consuming task for them to retrieve specific policies issued by their field offices. Field office researchers themselves may have similar difficulties locating the dissemination policies that apply to them. This may lead to confusion or may inhibit their decision to publicly disclose their research findings. Potential policy variations between an agency's different field offices regarding dissemination would further add to the confusion, particularly for inter-office research collaborations and when an employee transfers between an agency's offices.

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<sup>4</sup> See e.g., 7 U.S.C. § 3129(b), 5506(a); 15 U.S.C. § 7430(b)(2)(D); 42 U.S.C. §§ 299b(a), 299c-3(a)(1), 299a-1(a)(3), 300u-7(b)(3), 300cc-17, 290bb-34(b)(2), 285o-4(a)(5) and (b)(1), 285a-2(a)(2).

<sup>5</sup> See e.g., 7 U.S.C. §§ 5925a(e)(1), 7628, ; 15 U.S.C. §§ 7508; 42 U.S.C. §§ 12403(e), 15063(c)(2), 285m-3(e)(2).

<sup>6</sup> See also National Science and Technology Policy, Organization, and Priorities Act of 1976, Pub. L. 94-282 codified as 42 U.S.C. §§ 6601 and 6602.

<sup>7</sup> 35 U.S.C. § 205.

<sup>8</sup> See e.g., 30 C.F.R. §401.19; 50 C.F.R. § 82.21.



Some of these agencies did provide detailed anecdotes about what had been permitted by their field offices in the past. A few of the agencies have published related policies in their public affairs manuals. In most instances, however, policies or directives issued in these manuals may not be readily accessible by, or directly applicable to, an agency's research staff. The Board believes that absent clear agency-wide written directives, future field managers in those agencies may exercise their discretion differently than their predecessors in ways that could lead to more restrictive research disclosure practices. Dr. Griffin's outreach to the NASA in-house researchers is one way to effectively articulate an agency's goals of scientific openness. Unambiguous and publicly stated support from the Administration could strengthen an agency's public dissemination policies and encourage Federal researchers to publicly release their research findings.

The survey of the agencies' IGs indicated that no reports were issued to indicate scientific information was suppressed or distorted at the agencies involved with the Board's review.

### RECOMMENDATIONS

Based on our analysis, we offer the following recommendations:

- A Government-wide directive should be issued by the Administration that provides overarching principles and clearly articulates the requirement for all agencies to develop unambiguous policies and procedures to encourage open exchange of data and results of research conducted by agency scientists, while preventing the intentional or unintentional suppression or distortion of research findings and accommodating appropriate agency review. A developed set of principles should also state the concomitant responsibility of agency employees regarding the advocacy of public policy that might be implied by their research.
- Agency-wide policies covering the public disclosure of an agency's research results should be issued and uniformly applied, widely communicated, and readily accessible to all employees and the general public. Like those recently released by NASA, these policies should unambiguously describe what is and is not permitted or recommended. Responsibilities for communicating research results by researchers, public affairs officers, policy makers, and other agency employees should be clearly described. A clear distinction should be made between communicating professional research results and data versus the interpretation of data and results in a context that seeks to influence, through the injection of personal viewpoints, public opinion or formulation of public policy.
- An objective dispute resolution mechanism for disagreements involving the public dissemination of agency research findings should be implemented. This will help ensure the public has access to the research and that scientific findings presented are credible and of the highest quality.
- A Government-wide review should be established to ensure that implementation of these recommendations is conducted in a manner that meets the high standards expected and is consistent across agencies.

## SUMMARY

The National Science Board continues to stand by the principles of scientific openness that were presented in our 1988 report. The utilization of science in the creation of public policy is not part of the review that the Board has conducted in response to your request. However, the Board firmly believes that public policy should be based on the best available knowledge provided through objective science. We also agree with the 1976 National Science and Technology Policy, Organization and Priorities Act in which Congress declares that “the development and maintenance of a solid base for science and technology in the United States include[s] . . . effective management and dissemination of scientific and technological information,”<sup>9</sup> that “it is recognized as a responsibility of the Federal Government . . . to coordinate and unify its own science and technology information systems,”<sup>10</sup> and that “Federal departments, agencies, and instrumentalities should establish procedures to insure among them the systematic interchange of scientific data and technological findings developed under their programs.”<sup>11</sup>

The Board believes that there exists a need for all Federal agencies that conduct science to establish policies and procedures to encourage open exchange of data and results of research conducted by agency scientists, while also preventing the intentional or unintentional suppression or distortion of research findings. An overarching set of principles for the communication of scientific information by Government scientists, policy makers, and managers should be developed and issued by the Administration to serve as the umbrella under which each agency would develop its specific policies and procedures. Delay in taking these actions may contribute to a potential loss of confidence by the American public and broader research community regarding the quality and credibility of Government sponsored scientific research results. NASA’s revised policies and NOAA’s recent statement to employees on this topic are steps in the right direction.

The Board appreciates the opportunity to assist in furthering this important dialog, which you have initiated. If you or your staff have any questions or would like to discuss the Board’s review findings and recommendation in greater detail, please contact either myself or the Director of the Board Office, Dr. Michael Crosby (703-292-7000; [mcrosby@nsf.gov](mailto:mcrosby@nsf.gov)).

Sincerely,



Warren M. Washington  
Chairman

and Members of the Board

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<sup>9</sup> 42 U.S.C. § 6602(a)(5)(C).

<sup>10</sup> 42 U.S.C. § 6602(b)(2).

<sup>11</sup> 42 U.S.C. § 6602(b)(10).

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Jo Anne Vasquez

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**National Science Board  
Commission on 21<sup>st</sup> Century Education in  
Science, Technology, Engineering, and Mathematics<sup>+</sup>**

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Resident Scholar, Illinois Mathematics and Science Academy

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Frank B. Baird, Jr. Research Professor of Science, Harvard University

**Ms. Maria A. Lopez-Freeman**

Executive Director, California Science Project

**Dr. Maritza B. Macdonald**

Senior Director of Professional Development, American Museum of Natural History, New York City

**Mr. Timothy D. McCollum**

Science Teacher, Charleston (IL) Middle School

**Dr. Cindy Y. Moss**

Director of K-12 Science, Charlotte/Mecklenburg (NC) Public Schools

**Mr. Larry G. Prichard**

Superintendent, Carter County (KY) Schools

**The Honorable Louis Stokes**

**Former United States Congressman (OH)**

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<sup>+</sup> Dr. Steven C. Beering, Chairman of the National Science Board, will appoint one additional member to the Commission.

**Director's NSF Congressional Update  
May 2006**

Hearings:

Since the March NSB meeting, the following hearings involving the National Science Foundation (NSF) have been held or scheduled.

On April 5, Dr. David Ucko, Head of the Informal Science Education Program, testified before the Senate Homeland Security and Governmental Affairs Committee, Subcommittee on Federal Financial Management, Government Information, and International Security. The topic of the hearing was federal funding to support museums.

On May 2, the Senate Commerce Subcommittee on Science and Space will hold a hearing on the NSF and science priorities. The hearing will review highlights of the NSF Fiscal Year 2007 budget request and planned activities to implement America's Competitiveness Initiative, and to focus on NSF science priorities and resource allocations across scientific disciplines. Drs. Bement and Washington are scheduled to testify.

A field hearing on "Innovation and Information Technology: The Government, University, and Industry Roles in Information Technology Research and Commercialization" is scheduled for May 5 in Austin, Texas. Dr. Peter Freeman, Assistant Director for Computer and Information Sciences and Engineering will testify for NSF.

Legislation:

The following bills have been introduced since the last Congressional update:

- On March 8, Rep. Harold Ford, Jr. (D-TN) introduced H.R. 4906, the Twenty-first Century Innovation Act of 2006. Among other provisions, it directs NSF to establish programs awarding undergraduate and graduate scholarships in science, technology, engineering, and mathematics on the basis of criteria to be established by the Secretary of Education, but addressing areas of national need identified by program advisory bodies.
- On March 8, Sen. John Ensign (R-NV) introduced the National Innovation Act of 2006. Among other provisions, the bill would authorize an increase in funding for NSF from \$6.44 billion in 2007 to \$9.80 billion in 2011.
- On April 5, Rep. Ruben Hinojosa (D-TX) introduced H.R. 5106, legislation to amend the NSF Authorization Act of 2002 to authorize grants for Partnerships for Access to Laboratory Science (PALS). This program would award grants to high-need local educational agencies to establish partnerships for access to laboratory science to improve laboratories and provide instrumentation as part of a comprehensive program to enhance the quality of mathematics, science, engineering, and technology instruction at the secondary school level.

- On April 6, Rep. Rush Holt (D-NJ) introduced H.R. 5142, Accelerating the Creation of Teachers of Influence for Our Nation Act. The bill would establish a program at NSF to increase up to 10,000 per year the number of elementary and secondary science and mathematics teachers through a scholarship program encouraging students to obtain science, technology, engineering, and mathematics degrees with teacher certification, and for other purposes.
- On April 6, Rep. Rush Holt (D-NJ) also introduced H.R. 5142, the National Science Foundation Scholars Program Act. The bill provides for the establishment of a scholarship program at NSF to increase the population of science, mathematics, engineering and mathematics undergraduate students.