

## MEMORANDUM TO MEMBERS OF THE NATIONAL SCIENCE BOARD

**SUBJECT:** Summary Report of the March 29-30, 2007 Meeting

The major actions of the National Science Board (Board) at its 397th meeting on March 29-30, 2007 and a preliminary summary of the proceedings are provided. This memorandum will be publicly available for any interested parties to review. A more comprehensive set of Board meeting minutes will be posted on the Board's public Web site (<http://www.nsf.gov/nsb/>) following Board approval at the May 2007 meeting.

### 1. Major Actions of the Board (not in priority order):

- a. The Board approved the minutes of the Plenary Open Session (NSB-07-20) for the February 2007 meeting (<http://www.nsf.gov/nsb/meetings/2007/0208/minutes.pdf>). Minutes for the Plenary Executive Closed and Closed Sessions for the February 2007 meeting of the Board were also approved.
- b. The Board, by record vote, approved a resolution to close portions of the upcoming May 14-15, 2007 Board meeting dealing with staff appointments; future budgets; grants and contracts; specific Office of the Inspector General investigations and enforcement actions; and National Science Foundation (NSF) participation in a civil or administrative action, proceeding, or arbitration (<http://www.nsf.gov/nsb/meetings/2007/0514/closing.pdf>).
- c. The Board, by record vote, approved a change to the published March 2007 Plenary Agenda to add the agenda item on the Elections Committee topic because this item was required for agency business and no earlier announcement of the change was possible. This item was addressed in the closure resolution approved by the Board on February 7, 2007 and the corresponding General Counsel's certificate.
- d. The Board, by record vote, approved a change to the published March 2007 Committee on Programs and Plans Agenda to add the closed agenda item on the Scientific Ocean Drilling Vessel because this item was required for agency business and no earlier announcement of the change was possible. This item was addressed in the closure resolution approved by the Board on February 7, 2007 and the corresponding General Counsel's certificate.
- e. The Board approved a revision to their nomination and election protocol to have the Board Chairman appoint, instead of the full Board electing, Board Members to the *ad hoc* Committee on Nominating for NSB Elections during odd-numbered years for the election of Executive Committee members.

- f. The Chairman appointed the following Board Members to the *ad hoc* Committee on Nominating for NSB Elections, informally know as the Elections Committee: Drs. Hoffman, Randall, Sullivan, and Vasquez.
- g. The Board approved the recipient for the 2007 Alan T. Waterman Award: Dr. Peidong Yang, Associate Professor of Chemistry at the University of California, Berkley.
- h. The Board authorized the NSF Director, at his discretion, to extend the cooperative agreement “Management and Operations of the National Optical Astronomy Observatory and the National Solar Observatory.” (Excerpt from NSB-07-27, Attachment 1)
- i. The Board authorized the NSF Director, at his discretion, to continue funding the current cooperative agreement with Cornell University to manage and operate the National Astronomy and Ionosphere Center for the period October 1, 2006 to March 31, 2010.
- j. The Board approved a resolution (NSB-07-35) to support the recommendations of NSB/SOPI-07-2, to reaffirm its previous resolutions to support the NSF Director’s actions to meet requirements for polar icebreaking, and to urge a national policy review that could lead to recapitalizing the Coast Guard icebreaking fleet. (Attachments 2 and 3)
- k. The Board approved the report, *Enhancing Support of Transformative Research at the National Science Foundation* (NSB-07-32) (<http://www.nsf.gov/nsb/documents/2007/tr.pdf>), subject to final editing by the Board Chairman and Task Force on Transformative Research chairman.
- l. The Board approved the extension of the charge to the Task Force on Transformative Research through the end of the 2007 calendar year to review the NSF plan for implementation of the Transformative Research Initiative.
- m. The Board determined that the Board Commission on 21<sup>st</sup> Century Education in Science, Technology, Engineering, and Mathematics (STEM) fulfilled its charge to provide the Board with advice and recommendations for a “bold new action plan” for U.S. K-12 STEM education. The Board discharged this Commission as a Federal advisory committee, with thanks to the Commission Co-Chairmen, Drs. Leon Lederman and Shirley Malcom, and Commission members.

## **2. Board Chairman’s Report**

Dr. Steven Beering, Board Chairman, reported that in the Executive Closed Plenary Session, the Board approved the 2007 Alan T. Waterman Award recipient (see: 1.g.). This award, along with the Vannevar Bush Award and the NSB Public Service Awards, will be presented at the Board’s annual awards dinner on May 14, 2007 at the Department of State’s Diplomatic Reception Rooms.

The Chairman announced the appointment of the following Board Members to the *ad hoc* Committee on Nominating for NSB Elections, informally known as the Elections Committee:

Drs. Elizabeth Hoffman, Douglas Randall, Kathryn Sullivan, and Jo Anne Vasquez. *[The Board approved a revision to their nomination and election protocol to have the Board Chairman appoint, instead of the full Board electing, Board Members to this committee during odd-numbered years for the election of Executive Committee members.]*

Dr. Beering reported that he testified before the House Committee on Appropriations, Subcommittee on Commerce, Justice, and Science on February 28, 2007. His written statement was provided to Board Members and discusses the FY 2008 NSF budget request and the Board's budget for FY 2008. The statement also includes an overview of Board activities during the past year and summarizes the Board's recent oversight activities and policy directions for NSF, advice to the President and Congress, and outreach and communication to the broader community.

Following this testimony, two specific issues came up during the question and answer period, which required follow up. First, Chairman Alan Mollahan asked Dr. Beering to meet with him to discuss the potential for the Board to develop an overarching set of principles for the communication of scientific information by Government scientists, policy makers, and managers that should serve as the umbrella under which each agency would develop its specific policies and procedures. Chairman Mollahan raised this issue in the context of the Board's earlier response to Senator John McCain on this topic.

Second, the Board was asked that, should additional funds become available, how the Board would recommend funds be spent in support of education and human resources (EHR) programs that have been shown to be effective through rigorous merit review and assessment. In particular, the Board was asked whether the 3.5 percent increase in Research on Learning in Formal and Informal Settings over the FY 2007 request would be sufficient as a share of the NSF budget. Dr. Beering agreed that the Board would provide a detailed follow-up response to Congress.

Also, on March 20, 2007, Dr. Beering testified before the House Subcommittee on Research and Science Education, an authorization subcommittee. His written statement for this hearing was also provided to Board Members and addresses specific questions from Chairman Brian Baird in his letter of March 7, 2007. The Board responded to the following questions and issue: What NSF can do to nurture young investigators and improve their funding rates? What is the appropriate balance between funding for interdisciplinary and disciplinary research? What is the role for NSF in research driven by national needs? What are NSF's priorities in K-16 STEM education? Issues for consideration in the NSF reauthorization.

The new public Board Web site, which was discussed at the Board Retreat in February 2007, has many improvements over the current Web site. Dr. Beering requested that Board Members forward comments to Dr. Michael Crosby, Executive Officer and Board Office Director, by mid-April 2007. It was anticipated that the new Web site would be posted and available to the public before the May 2007 Board meeting.

Also, Board Members were asked to respond to the Board Office poll for the 2008 calendar for Board meeting dates. As announced at the February 2007 meeting, Board Members had been polled to ensure attendance by the highest number of voting Members possible. The poll

included those Board Members whose terms expire in May 2008, but could continue as Board Consultants. The Board Office will provide a draft 2008 meeting schedule to all Board Members in mid-April 2007, and Board Members will vote on the final 2008 calendar meeting dates at the Board meeting in May 2007.

Dr. Beering announced that Dr. Vasquez would lecture at the New York Academy of Sciences and the Science Education Section meeting in April 2007. She would also be the recipient of the Willard Jacobson Award, an annual award given to a science teacher who has made major contributions to the field of science education.

Dr. Beering also recognized Mrs. Susan Fannoney of the Board Office, who had most recently served as Senior Associate for Operations and Honorary Awards. Mrs. Fannoney was about to retire from more than 26 years of Federal service. For the past 20 years, the Board and Board Office have benefited from her exceptional, dedicated service.

### **3. Commission on 21<sup>st</sup> Century Education in Science, Technology, Engineering, and Mathematics (STEM)**

Dr. Beering stated that, in his testimony on March 20, 2007, Members of the congressional subcommittee expressed their eagerness to receive the Board's final action plan to address the Nation's needs for 21<sup>st</sup> century science, technology, engineering, and mathematics (STEM) education. He thanked and commended all the members of the Commission for their dedicated service and hard work to completely revise the report on a fast timeline, in particular the Commission Co-Chairmen, Dr. Leon Lederman and Dr. Shirley Malcom.

Dr. Vasquez, Commission Vice Chairman, reported that since the February 2007 Board meeting, the leaders of the Commission worked to incorporate Board suggestions and to provide Board Members with a revised report. The full Commission held two teleconferences to discuss the report revisions on February 21 and March 8, 2007, and voted unanimously to approve the revised report, which was provided to Board Members, based on comments from the Board at the February 2007 meeting and other meetings and discussions of the Commission. In the revised report, the overall thrust of the Commission recommendations for a national action plan remains unchanged from the draft report that the Board reviewed at the February 2007 meeting. However, the text describing the recommendations was revised, and introductory material was added to place the Commission's recommendations in context with the complete report. The key recommendation of the Commission is that STEM education should ideally occur in a coherent system that is horizontally coordinated within and among states, that is vertically aligned from pre-K through graduate education, and that has effective teachers fully integrated into the system. The goal of the Commission was to develop recommendations for pieces of a national action plan that would assign responsibilities to various entities. The Commission was hesitant to recommend increasing bureaucracy and tried to assign responsibilities to existing entities. The Commission identified some needs that could be met through a national, non-Federal coordinating body, and the establishment and expanded use of P-16 (or P-20) councils in states. Dr. Vasquez reported that the Commission had been faithful to its charge to develop findings and recommendations to submit to the Board for a bold new action plan. Dr. Lederman, Nobel Laureate and Co-Chairman of the Commission on 21<sup>st</sup> Century Education in STEM joined the Board for this topic at the March 2007 Board meeting. *[The Board determined that the STEM*

*Commission fulfilled its charge to provide the Board with advice and recommendations for a “bold new action plan” for K-12 STEM education, and discharged the Commission as a Federal advisory committee.]*

#### **4. NSF Director’s Report**

Dr. Arden Bement, NSF Director, announced the following awards to NSF staff.

- Dr. Karl Erb, Director of the Office of Polar Programs, was awarded the New Zealand Antarctic Medal, Queen Elizabeth II’s New Years Honors List, which was inaugurated this year to replace the British Polar Medal. New Zealand Prime Minister Helen Clark presented the Medal to Dr. Erb at Blair House in March 2007. The award commemorates the strong U.S.-New Zealand partnership in Antarctic research, logistics and environmental stewardship. It was presented in recognition of Dr. Erb’s efforts to further the partnership over the last 10 years.
- Dr. Wanda Ward was presented the "Louttit Award" at the annual meeting of the Federation of Behavioral, Cognitive, and Psychological Sciences on December 6, 2006. The Federation bestows only one award, and the goal is to honor scientists in the Federal Government who have advanced the behavioral sciences through their service. Dr. Ward is the sixth recipient of this award. She has served as the Deputy Assistant Director of the Social, Behavioral, and Economic Sciences Directorate and currently serves as Deputy Assistant Director of the Education and Human Resources Directorate.
- Mr. Thomas Cooley, NSF Chief Financial Officer, was awarded the Donald L. Scantlebury Memorial Award in financial management, the highest honor bestowed in financial management for service in the public sector. This award that recognizes senior financial management executives who have been principally responsible for significant efficiencies and improvements in Federal, State, and local Government.
- The Office of Legislative and Public Affairs (OLPA) won four, first place awards in the National Association of Government Communicators (NAGC) 2006 professional competency competition. NSF earned more awards than any other agency or department in the annual competition. NAGC is a national not-for-profit professional network of more than 35,000 Federal, State and local Government employees who disseminate information within and outside Government.
- OLPA also was selected for the CINE, Golden Eagle *Special Jury Award*, an award for best science documentary for the production of "Einstein's Messengers," an NSF video about Laser Interferometer Gravitational-Wave Observatory (LIGO). CINE was founded in 1957 by a consortium representing business, education, and government to depict American life and thought for a global audience. Dr. Bement thanked Mr. Jeffery Nesbitt, OLPA Director, and the OLPA staff.

Dr. Bement announced the 12<sup>th</sup> anniversary of FastLane, an interactive, 24-hour, real-time grants management application that uses the World Wide Web to facilitate business transactions and exchange information between NSF and its client community. Since its inception, FastLane has

grown to support over 7,000 organizations and over 250,000 registered users. To date, NSF has allowed for the submission of over 320,000 proposals; 70,000 post award notifications and requests; and 160,000 project reports via FastLane. Dr. Bement stated that FastLane is an eGovernment success story, and thanked those who have supported it over the past 12 years.

Copies of the Director's congressional update, which included information on a number hearings and legislation relating to NSF, were provided to Board Members.

## **5. Board Committee Reports**

(Note: The Executive Committee did not meet in March 2007.)

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

#### A&O Open Session

The A&O chairman stated that since the Board's February meeting, he had met with the Office of Inspector General (OIG) and NSF staff, and was pleased with the progress being made as they work together to address the reportable conditions on the FY 2006 financial statement audit. He also had been following the negotiations related to the resolution of the Raytheon related audits, and noted that progress was being made and that complex issues are being resolved. There will be an update at the May meeting.

NSF's Drs. James Lightbourne and Joanne Tornow provided the highlights of NSF's annual Merit Review Process report, and noted the following: funding rate for NSF proposals was 25 percent in FY 2006, up slightly from FY 2005; the average and median award size increased steadily from FY 1999 to FY 2005, dropping somewhat in FY 2006; NSF's capacity to fund highly-rated proposals eroded--in FY 1997, one highly-rated proposal was declined for every three that were funded, in FY 2006, two highly-rated proposals were declined for every three funded; and use of mail-only review decreased while use of panel-only review increased. During Board discussion, several queries for additional data were raised, and NSF will follow up on gathering data such as geographic patterns and success rates and on statistics regarding unsolicited multiple principal investigator (PI) proposals.

Dr. Kathie Olsen, NSF Deputy Director, briefed the committee on NSF's Framework for Human Capital Management. NSF established a formal workforce planning process aimed at identifying priority needs in the workforce, action strategies to address those needs, and metrics to evaluate the effectiveness of those strategies. Mr. Thomas Cooley, NSF Chief Financial Officer, and his team provided a briefing on how NSF resolves audits of NSF awardees. Mr. Cooley gave an update of the progress made on the Corrective Action Plan undertaken in response to the audit of NSF's own FY 2006 financial statements and the FY 2007 financial statement audit process, including the impact of new and more stringent Government-wide audit standards this cycle.

Dr. Christine Boesz, NSF Inspector General, informed the committee that the OIG is planning to initiate an audit of NSF's audit resolution process later this year. She also noted that the FY 2007 financial statement audit had begun and that it is funded from OIG appropriations, to assure independence. Mr. Salvatore Ercolano, Partner-in-Charge with Clifton Gunderson LLP, agreed with Mr. Cooley's statements about this year's audit.

A&O, together with CSB, shared an interest in the impact of any potential changes to the Board's cost sharing policy for NSF grants. A&O and CSB will work to examine implications of the Board's previous actions and what might be done to further refine guidance in this area.

#### A&O Closed Session

The committee was presented information about several pending investigations.

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

The committee noted the Board's recent response to a request from Congressman Rush Holt, for the Board to provide a summary of its review of the NSF's EHR Directorate program evaluations. The Board responded to Congressman Holt in a preliminary report in January 2007, promising a more thorough report later in 2007.

The committee heard from Dr. Cora Marrett, Assistant Director for the NSF EHR Directorate, on several topics identified by the Board at its February 2007 meeting including: an update on NSF responsibilities in the Math and Science Partnership program and recent interagency activities related to STEM education; an outline of the larger, longer term objectives that propel and are formative for NSF in STEM education programs; and an update on recent and planned NSF EHR organizational changes.

Dr. Marrett provided the Committee with useful information on a vision for the future of NSF EHR. She outlined the NSF EHR mission and goals, discussed the revised organizational structure, plans to sustain NSF's leadership in STEM education, and enhanced partnerships and linkages through the NSF, other agencies, industry, and international programs. She noted that it is the goal of NSF EHR was to cultivate excellence in all endeavors as it strives to enable excellence in U.S. STEM education at all levels and to promote a diverse STEM workforce.

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

The subcommittee discussed the reviewer comments and author responses for the K-12 and State chapters of *Science and Engineering Indicators 2008*, and examined the key findings in both chapters to determine which ones might be included in the new condensed version or digest of *Indicators*. The subcommittee also continued a discussion of *Science and Engineering Indicators 2010*.

#### **d. EHR *ad hoc* Engineering Education Group**

The *ad hoc* group is compiling a document to summarize the findings of two workshops held in October 2005 and November 2006. This document will be provided to the NSF Directorate for Engineering for implementation.

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

### CPP Open Session

The committee held discussions on recompetition, operations, and management costs for NSF contracts, cooperative agreements, and grants. The committee asked that NSF provide additional information and that NSF and the Board Office work together to clarify the scope and form of information requested, the remaining data gaps, and the timeframe for the delivery of the information.

CPP also considered potential impacts to the major research equipment and facilities construction (MREFC). Dr. Bement briefed the committee on potential impacts to the MREFC program from the realities of the FY 2007 budget and the FY 2008 request; specifically current Board policies, factors influencing the FY 2007 current plan, the status of new start projects, as well as other considerations.

Dr. Jon Strauss noted that several recent informal luncheon presentations seemed to have energized the Board regarding the need for our Nation to address both the scientific and engineering challenges in developing alternative sustainable energy sources that would not further contribute to global carbon loading (and possibly serve to reduce the existing global carbon load). Dr. Ford, CPP chairman, suggested, and CPP concurred, that Dr. Strauss should develop an informal *ad hoc* task group to formulate more specific options for CPP to consider as possible steps to recommend for the full Board to take in terms of developing science and engineering policy guidance to NSF and advice to the President and Congress on this issue.

Finally, the committee heard an update on the Division of Astronomical Sciences Senior Review. Dr. Tony Chan, the Assistant Director of the Mathematics and Physical Science Directorate, and Dr. Wayne Van Citters, Division Director of the Astronomical Sciences Division, provided the committee with this update to establish a framework for the two action items submitted to CPP for consideration in closed session.

### CPP Closed Session

The committee considered and approved two action items: NOAO and NSO - the National Optical Astronomy Observatory and the National Solar Observatory (NSB-07-27) (Attachment 1), and NAIC - National Astronomy and Ionosphere Center (NSB-07-28) (see: 1.i.). [*The Board approved both resolutions.*] The committee also heard an information item on the Scientific Ocean Drilling Vessel.

## **f. CPP Subcommittee on Polar Issues (SOPI)**

Dr. Erb presented an overview on NSF's engagement of the Swedish icebreaker *Oden* in U.S. Antarctic Program activities this past austral summer. He reported that the *Oden* proved to be a very capable icebreaker and was able to clear the path to the McMurdo Station pier unassisted. The *Oden* is also a world class research platform and a group of U.S., Swedish, and Chilean scientists and teachers carried out on-board science, education, and outreach activities on the passage from Punta Arenas to McMurdo.

Dr. Barry Barish, SOPI chairman, presented a draft NSB resolution (NSB-07-35) to support the recommendations of White Paper on Support for Icebreakers (NSB/SOPI-07-2) in response to the recommendations put forth by the NAS Committee on the Assessment of U.S. Coast Guard (USCG) Polar Icebreaker Roles and Future Needs. These documents reaffirm previous Board resolutions supporting the NSF Director to take all steps necessary to meet the polar ice-breaking needs of the research community in the most cost-effective manner. In addition, the resolution supports the National Research Council recommendations and urges a national policy review that could lead to recapitalizing the USCG icebreaking fleet, noting that such costs should not be borne by the NSF. (Attachments 2 and 3). *[The Board approved the above resolution.]*

Mr. Larry Rudolph, NSF General Counsel, provided an overview of international obligations adopted by the Antarctic Treaty consultative parties that concern NSF, specifically focusing on search and rescue requirements for non-governmental activities and environmental emergency response.

#### **g. CPP Task Force on International Science (INT)**

The task force heard an overview of the two task force discussions held earlier in the month with a diverse group of science and technology leaders from the European community: the final Task Force Roundtable Discussion on International Science Partnerships, held in Brussels on March 9, 2007; and informal discussions held in Trieste, Italy with representatives of the Abdus Salam International Center for Theoretical Physics and the Academy of Sciences for the Developing World on March 13, 2007.

The task force heard two presentations: Dr. Alan Leshner, Board Member, on the Kuwaiti Conference on Women Leaders in Science, Technology, and Engineering that he attended in January 2007; and Dr. Richard Bissell and Ms. Patricia Koshel, National Academies of Science (NAS), on the NAS report, *The Fundamental Role of Science and Technology in International Development: An Imperative for the U.S. Agency for International Development*.

Finally, the task force discussed future activities, including the production of a draft of its final report and recommendations.

#### **h. CPP Task Force on Transformative Research (TR)**

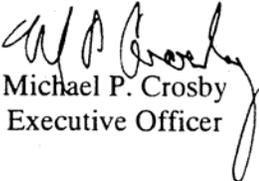
The task force reviewed the final report on support of transformative research. The task force approved an extension of the task force charge for the full 2007 calendar year to lead the Board review of the NSF implementation plan of the Transformative Research Initiative. *[The Board approved the “final for Board approval” report, Enhancing Support of Transformative Research at the National Science Foundation (NSB-07-6). Following final editing by the Board Chairman and task force chairman, a “pre-publication copy” of the report (NSB-07-32) was released (see: I.k.). The Board also approved the extension of the charge to the task force through the end of the 2007 calendar year to review the NSF plan for implementation of the Transformative Research Initiative.]*

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

The committee noted that Dr. Beering's testimony to Congress on March 20, 2007 highlighted overseeing implementation of the NSF Strategic Plan as a major Board activity.

CSB expressed concerns about the impacts and unintended consequences of NSF and Board cost-sharing policies at universities at the February 2007 meeting. Mr. Cooley gave a presentation on the history and current status of cost sharing at NSF. NSF appropriations no longer contain a cost sharing requirement; therefore, cost sharing will be eliminated for awards made on or after June 1, 2007. CSB approved the formation of an *ad hoc* Working Group on Cost Sharing to look more closely at the impacts of cost sharing policies within the research community.

Dr. Olsen gave an update on the progress of the Working Group on the Impact of Proposal and Award Management Mechanisms (IPAMM). The working group recently conducted a survey of NSF PIs who submitted proposals in the last 3 fiscal years. The survey was designed to learn more about the motivations and impacts in proposal submissions and PI perceptions of success rates.



Michael P. Crosby  
Executive Officer

Attachment 1: [NSB-07-27](#)

Attachment 2: [NSB-07-35](#)

Attachment 3: [NSB/SOPI-07-2](#)

## RESOLUTION

### NATIONAL SCIENCE BOARD

#### SUPPORT FOR THE MANAGEMENT AND OPERATIONS OF THE NATIONAL OPTICAL ASTRONOMY OBSERVATORY AND THE NATIONAL SOLAR OBSERVATORY

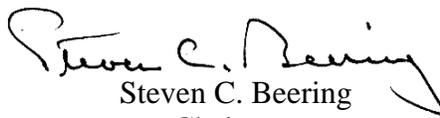
WHEREAS the National Science Foundation conducted a Review in August 2006 of the performance of the Association of Universities for Research in Astronomy with respect to management of the National Optical Astronomy Observatory and the National Solar Observatory which review unanimously praised the performance of the Association of Universities for Research in Astronomy; and

WHEREAS the National Science Board takes note that the Management Review Panel recommended that:

- the management of the National Optical Astronomy Observatory and the National Solar Observatory be separated into two distinct Cooperative Agreements,
- Visiting Committees be re-instituted for the two observatories, and
- the Association of Universities for Research in Astronomy find innovative ways to promote a skilled and diverse workforce; and

WHEREAS the National Science Board recognizes that the Association of Universities for Research in Astronomy is taking action on these three recommendations, and that the National Science Board supports the Management Review Panel recommendations and their implementation; and

NOW, therefore, be it RESOLVED, that the National Science Board authorized the Director at his discretion to extend the Cooperative Agreement *Management and Operations of the National Optical Astronomy Observatory and the National Solar Observatory (AST-0132798, PI William S. Smith)* for a total amount not to exceed \$313,141,870 and for a total duration not to exceed 78 months.

  
Steven C. Beering  
Chairman

**RESOLUTION**

NATIONAL SCIENCE BOARD

U.S. ANTARCTIC PROGRAM ICEBREAKING RESOLUTION

WHEREAS research conducted in the earth's polar regions is critical for understanding phenomena of global importance and polar regions offer unique opportunities for forefront scientific research in a broad range of disciplines; and

WHEREAS the National Science Foundation (NSF) is the principal supporter of research conducted by U.S. scientists in the polar regions; and

WHEREAS the NSF is responsible for implementing U.S. policy calling for an active and influential presence in Antarctica through year-round scientific activity at the south pole and at two coastal research stations; and

WHEREAS the above activities depend critically upon the availability of heavy icebreaking services but two of the three U.S. icebreakers capable of supporting these activities are nearing the end of their design lifetimes, have become expensive to operate and maintain, and cannot be relied on indefinitely; and

WHEREAS Board Resolution (NSB-05-68) and (NSB-05-100) supports the NSF Director taking all necessary steps to meet the requirements for polar icebreaking among available options to best meet the needs of the research community in the most cost effective manner; and

NOTING that pursuant to these National Science Board (Board) Resolutions the Swedish icebreaker *Oden*, with state-of-the art icebreaking capabilities, was able to open the channel to McMurdo without assistance this past season, provided an excellent platform for U.S. research and education activities while en route to McMurdo Station, and was obtained at a fair market price; and

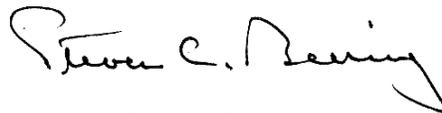
NOTING the recommendations of the National Research Council in *Polar Icebreakers in a Changing World: An Assessment of U.S. Needs*, September 26, 2006;

NOTING the discussion and recommendations in the White Paper on Support for Icebreakers prepared by the Subcommittee on Polar Issues, (NSB/SOPI-07-2), March 29, 2007;

Therefore, be it RESOLVED, that the Board supports the recommendations of (NSB/SOPI-07-2), March 29, 2007.

Moreover, be it RESOLVED that the Board reaffirms its previous Resolutions supporting the NSF Director taking all necessary steps to meet the requirements for polar ice-breaking among available options to best meet the needs of the research community in the most cost-effective manner.

Moreover, be it RESOLVED that the Board urges a national policy review that could lead to recapitalizing the Coast Guard icebreaking fleet, and agrees with the National Research Council recommendation that costs to operate and maintain the fleet should be budgeted for by the Coast Guard and that any fleet usage by NSF should be reimbursed by NSF only at the marginal cost rate. Furthermore, if national policy calls for recapitalization of the Coast Guard fleet, recapitalization costs should not be borne by the NSF.

A handwritten signature in black ink that reads "Steven C. Beering". The signature is written in a cursive style with a large, sweeping initial "S".

Steven C. Beering  
Chairman

National Science Board  
Committee on Programs and Plans  
Subcommittee on Polar Issues

**White Paper on Support for Icebreakers**

Dr. Anita K. Jones, former NSB member and Chair of the National Research Council (NRC) study, *Polar Icebreakers in a Changing World: An Assessment of U.S. Needs*, briefed the Board at its November 2006 meeting on the study and on its conclusions. Following the briefing and subsequent discussion, Dr. Barry Barish, Chair of the NSB Subcommittee on Polar Issues, suggested that the Board review its earlier statements on polar icebreakers in view of the new study report.

The NRC report emphasized that “The United States has enduring national and strategic interests in the Arctic and Antarctic and the importance of these regions is growing with time” and addressed the fact that “... U.S. icebreaking capability is now at risk of being unable to support [those] national interests in the north and the south.”

Among the national interests discussed in the report is long-standing U.S. policy requiring an active and influential presence in Antarctica through year-round occupation of South Pole Station and two coastal stations for scientific research and environmental stewardship. The responsibility for implementing this policy was assigned to NSF in National Security Decision Memorandum 71 (July 1970) and reaffirmed in Presidential Decision Directive 6646 (February, 1982).

NSF’s ability to meet this responsibility has been compromised by the deteriorating condition of the two U.S. icebreakers capable of supporting this activity. The two Coast Guard “polar class” icebreakers are nearing the end of their design lifetimes and have not been well-maintained owing to lack of funds. As a consequence, their reliability has suffered. One has now been placed in caretaker status. NSF has had to contract for non-U.S. icebreakers in order to assure continued re-supply of McMurdo and South Pole Stations.

The NRC report and Dr. Jones, in her briefing, also stressed that climate change in the Arctic is likely to bring increased economic activity and more generally, greater human activity, all of which “will increase the need for the United States to assert a more active and influential presence in the Arctic...” Currently, U.S. presence in the Arctic Ocean is expressed almost completely by research expeditions aboard the Coast Guard cutter HEALY and supported by NSF and to a lesser extent, by NOAA through NSF. Should HEALY be called upon to support a potentially emerging range of additional national missions, the research community could lose access to this scientific frontier.

Against this background the NRC study motivates and provides important input to a future national policy review that would provide the framework for assuring the necessary icebreaker support for achieving key national goals in the Arctic and Antarctic over the long term, including those of the research community. NSF's icebreaking interests center on supporting fundamental research and maintaining the Antarctic research stations. The policy review would assess the full range of national interests in a capable U.S. icebreaker fleet and thus would elicit input from other federal agencies such as DOD, DOC, DOI, and DHS as well as the interests of Alaska residents, the research community and NSF and the Coast Guard. Dr. Jones strongly urged that a policy review be initiated at the earliest possible date.

The NRC committee concluded that "National interests in the polar regions require that the U.S. immediately program, budget, design, and construct two new polar icebreakers to be operated by the U.S. Coast Guard." It further recommended that "...the Coast Guard be provided [with] sufficient operations and maintenance budget to support an increased, regular, and influential presence in the Arctic."

The construction of new U.S. icebreakers would take perhaps eight to ten years after construction funds had been appropriated, and Dr. Jones noted that NSF will need to be creative during the interim in meeting the needs of the community it supports.

In the north even the most robust icebreakers have difficulty in accessing portions of the Arctic Ocean in winter, while scientific interest in this frontier has increased rapidly. This has led to a rapidly growing trend toward multi-ship expeditions, with ships from several countries participating and assisting each other in negotiating heavy ice regions.

In the south, because of concerns about the reliability of the Coast Guard polar class icebreakers NSF has chartered non-U.S. icebreakers during each of the last three years to assist in opening the ice channel that enables re-supply of McMurdo and South Pole Stations. Most recently NSF arranged with Sweden for the ODEN, a research icebreaker, to provide this assistance and arranged for scientific and educational activities aboard ship that involved U.S., Swedish and Chilean researchers and teachers. In the process, ODEN demonstrated the ability to open the supply channel through the ice working alone.

The advent of International Polar Year places extra emphasis on maintaining NSF's ability to provide leadership in polar regions research on behalf of the USG.

In view of these observations the Subcommittee on Polar Issues recommends:

- That the White House Office of Science and Technology Policy conduct a national policy review of the nation's needs for heavy icebreakers;
- That the NSF Director participate in that review;
- That the White House and the Congress decide how best to recapitalize, operate and maintain the Coast Guard icebreaker fleet, but that NSF be given responsibility only for meeting the needs of the research community in the most cost-effective, reliable manner;
- That NSF and the USCG work together to maintain POLAR SEA and HEALY in the interim;

- That NSF explore alternate short- and long-term options for securing USAP re-supply services in order to assess their potential cost-effectiveness and reliability;
- That NSF continue to work to develop durable partnerships with other countries on the basis of mutual scientific interest to augment U.S. capabilities for polar research and for meeting its responsibilities to the U. S. Antarctic Program.