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REPORT
107–488

INVESTING IN AMERICA'S FUTURE ACT OF 2002

JUNE 4, 2002.—Committed to the Committee of the Whole House on the State of the Union and ordered to be printed

Mr. BOEHLERT, from the Committee on Science, submitted the following

R E P O R T

[To accompany H.R. 4664]

[Including cost estimate of the Congressional Budget Office]

The Committee on Science, to whom was referred the bill (H.R. 4664) to authorize appropriations for fiscal years 2003, 2004, and 2005 for the National Science Foundation, and for other purposes, having considered the same, report favorably thereon with an amendment and recommend that the bill as amended do pass.

CONTENTS

I. AMENDMENT

The amendment is as follows:

Strike all after the enacting clause and insert the following:

SECTION 1. SHORT TITLE.

This Act may be cited as the "Investing in America's Future Act of 2002".

SEC. 2 DEFINITIONS.

In this Act:

(1) BOARD.—The term "Board" means the National Science Board established under section 2 of the National Science Foundation Act of 1950 (42 U.S.C. 1861).

(2) DIRECTOR.—The term "Director" means the Director of the National Science Foundation.

(3) FOUNDATION.—The term "Foundation" means the National Science Foundation.

(4) INSTITUTION OF HIGHER EDUCATION.—The term "institution of higher education" has the meaning given that term in section 101(a) of the Higher Education Act of 1965 (20 U.S.C. 1001(a)).

(5) NATIONAL RESEARCH FACILITY.—The term "national research facility" means a research facility funded by the Foundation which is available, subject to appropriate policies allocating access, for use by all scientists and engineers affiliated with research institutions located in the United States.

(6) UNITED STATES.—The term "United States" means the several States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and any other territory or possession of the United States.

SEC. 3. AUTHORIZATION OF APPROPRIATIONS.

(a) FISCAL YEAR 2003.—

(1) IN GENERAL.—There are authorized to be appropriated to the National Science Foundation $5,515,260,000 for fiscal year 2003.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $4,138,440,000 shall be made available to carry out Research and Related Activities, of which—

(i) $704,000,000 shall be for networking and information technology research;

(ii) $238,450,000 shall be for the Nanoscale Science and Engineering Priority Area;

(iii) $60,090,000 shall be for the Mathematical Sciences Priority Area; and

(iv) $75,900,000 shall be for Major Research Instrumentation;

(B) $1,006,250,000 shall be made available for Education and Human Resources, of which—

(i) $50,000,000 shall be for the Advanced Technological Education Program established under section 3 of the Scientific and Advanced-Technology Act of 1992 (42 U.S.C. 1862i); and

(ii) $30,000,000 shall be for the Minority Serving Institutions Undergraduate Program;

(C) $152,350,000 shall be made available for Major Research Equipment and Facilities Construction;

(D) $210,160,000 shall be made available for Salaries and Expenses; and

(E) $8,060,000 shall be made available for the Office of Inspector General.

(b) FISCAL YEAR 2004.—

(1) IN GENERAL.—There are authorized to be appropriated to the National Science Foundation $6,342,550,000 for fiscal year 2004.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $4,735,600,000 shall be made available to carry out Research and Related Activities, of which—

(i) $774,000,000 shall be for networking and information technology research;

(ii) $286,140,000 shall be for the Nanoscale Science and Engineering Priority Area;

(iii) $90,090,000 shall be for the Mathematical Sciences Priority Area; and

(iv) $85,000,000 shall be for Major Research Instrumentation;

(B) $1,157,190,000 shall be made available for Education and Human Resources, of which $55,000,000 shall be for the Advanced Technological Education Program established under section 3 of the Scientific and Advanced-Technology Act of 1992 (42 U.S.C. 1862i);

(C) $225,000,000 shall be made available for Major Research Equipment and Facilities Construction;

(D) $216,460,000 shall be made available for Salaries and Expenses; and

(E) $8,300,000 shall be made available for the Office of Inspector General.

(c) FISCAL YEAR 2005.—

(1) IN GENERAL.—There are authorized to be appropriated to the National Science Foundation $7,293,930,000 for fiscal year 2005.

(2) SPECIFIC ALLOCATIONS.—Of the amount authorized under paragraph (1)—

(A) $5,445,940,000 shall be made available to carry out Research and Related Activities;

(B) $1,330,770,000 shall be made available for Education and Human Resources;

(C) $285,710,000 shall be made available for Major Research Equipment and Facilities Construction;

(D) $222,960,000 shall be made available for Salaries and Expenses; and

(E) $8,550,000 shall be made available for the Office of Inspector General.

SEC. 4. OBLIGATION OF MAJOR RESEARCH EQUIPMENT FUNDS

(a) FISCAL YEAR 2003.—None of the funds authorized under section 3(a)(2)(C) may be obligated until 30 days after the first report required under section 7(a)(2) is transmitted to the Congress.

(b) FISCAL YEAR 2004.—None of the funds authorized under section 3(b)(2)(C) may be obligated until 30 days after the report required by June 15, 2003, under section 7(a)(2) is transmitted to the Congress.

(c) FISCAL YEAR 2005.—None of the funds authorized under section 3(c)(2)(C) may be obligated until 30 days after the report required by June 15, 2004, under section 7(a)(2) is transmitted to the Congress.

SEC. 5. ANNUAL PLAN FOR ALLOCATION OF FUNDING.

Not later than 60 days after the date of enactment of legislation providing for the annual appropriation of funds for the Foundation, the Director shall submit to the Committee on Science of the House of Representatives, the Committee on Commerce, Science, and Transportation of the Senate, and the Committee on Health, Education, Labor, and Pensions of the Senate, a plan for the allocation of funds authorized by this Act for the corresponding fiscal year. The portion of the plan pertaining to Research and Related Activities shall include a description of how the allocation of funding—

(1) will affect the average size and duration of research grants supported by the Foundation by field of science, mathematics, and engineering;

(2) will affect trends in research support for major fields and subfields of science, mathematics, and engineering, including for emerging multidisciplinary research areas; and

(3) is designed to achieve an appropriate balance among major fields and subfields of science, mathematics, and engineering.

SEC. 6. PROPORTIONAL REDUCTION.

(a) OVERALL AMOUNTS.—If the amount appropriated pursuant to section 3(a)(1), (b)(1), or (c)(1) is less than the amount authorized under that paragraph, the amount available under each subparagraph of paragraph (2) of that subsection shall be reduced by the same proportion.

(b) RESEARCH AND RELATED ACTIVITIES AMOUNTS.—If the amount appropriated pursuant to section 3(a)(2)(A) or (b)(2)(A) is less than the amount authorized under that subparagraph, the amount available under each clause of that subparagraph shall be reduced by the same proportion.

SEC. 7. NATIONAL RESEARCH FACILITIES.

(a) PRIORITIZATION OF PROPOSED MAJOR RESEARCH EQUIPMENT AND FACILITIES CONSTRUCTION.—

(1) DEVELOPMENT OF PRIORITIES.—

(A) LIST.—The Director shall develop a list indicating by number the relative priority for funding under the Major Research Equipment and Facilities Construction account that the Director assigns to each project the Board has approved for inclusion in a future budget request. The Director shall submit the list to the Board for approval.

(B) UPDATES.—The Director shall update the list prepared under paragraph (1) each time the Board approves a new project that would receive funding under the Major Research Equipment and Facilities Construction account and as necessary to prepare reports under paragraph (2). The Director shall submit any updated list to the Board for approval.

(2) ANNUAL REPORT.—Not later than 90 days after the date of the enactment of this Act, and not later than each June 15th thereafter, the Director shall transmit to the Congress a report containing—

(A) the most recent Board-approved priority list developed under paragraph (1);

(B) a description of the criteria used to develop such list; and

(C) a description of the major factors for each project that determined its ranking on the list, based on the application of the criteria described pursuant to subparagraph (B).

(3) CRITERIA.—The criteria described pursuant to paragraph (2)(B) shall include, at a minimum—

(A) scientific merit;

(B) broad societal need and probable impact;

(C) consideration of the results of formal prioritization efforts by the scientific community;

(D) readiness of plans for construction and operation;

(E) international and interagency commitments; and

(F) the order in which projects were approved by the Board for inclusion in a future budget request.

(b) FACILITIES PLAN.—

(1) IN GENERAL.—Section 201(a)(1) of the National Science Foundation Authorization Act of 1998 (42 U.S.C. 1862l(a)(1)) is amended to read as follows:

"(1) IN GENERAL.—The Director shall prepare, and include as part of the Foundation's annual budget request to Congress, a plan for the proposed construction of, and repair and upgrades to, national research facilities, including full life-cycle cost information.".

(2) CONTENTS OF PLAN.—Section 201(a)(2) of the National Science Foundation Authorization Act of 1998 (42 U.S.C. 1862l(a)(2)) is amended—

(A) in subparagraph (A), by inserting ", including costs for instrumentation development" after "described in paragraph (1)";

(B) by striking "and" at the end of subparagraph (B);

(C) by striking the period at the end of subparagraph (C) and inserting a semicolon; and

(D) by adding at the end the following new subparagraphs:

"(D) for each project funded under the Major Research Equipment and Facilities Construction account—

"(i) estimates of the total project cost (from planning to commissioning); and

"(ii) the source of funds, including Federal funding identified by appropriations category and non-Federal funding;

"(E) estimates of the full life-cycle cost of each national research facility;

"(F) information on any plans to retire national research facilities; and

"(G) estimates of funding levels for grants supporting research that will make use of each national research facility.".

(3) DEFINITION.—Section 2 of the National Science Foundation Authorization Act of 1998 (42 U.S.C. 1862k note) is amended—

(A) by redesignating paragraphs (3) through (5) as paragraphs (4) through (6), respectively; and

(B) by inserting after paragraph (2) the following new paragraph:

"(3) FULL LIFE-CYCLE COST.—The term 'full life-cycle cost' means all costs of development, procurement, construction, operations and support, and shut down costs, without regard to funding source and without regard to what entity manages the project.".

(c) PROJECT MANAGEMENT.—No national research facility project funded under the Major Research Equipment and Facilities Construction account shall be managed by an individual whose appointment to the Foundation is temporary.

SEC. 8. MAJOR RESEARCH INSTRUMENTATION.

The Foundation shall conduct a review and assessment of the Major Research Instrumentation Program and provide a report to Congress on its findings and recommendations within 1 year after the date of the enactment of this Act. The report shall include—

(1) estimates of the needs, by major field of science and engineering, of institutions of higher education for the types of research instrumentation that are eligible for funding under the guidelines of the Major Research Instrumentation Program;

(2) the distribution of awards and funding levels by year and by major field of science and engineering for the Major Research Instrumentation Program, since the inception of the Program; and

(3) an analysis of the impact of the Major Research Instrumentation Program on the research instrumentation needs that were documented in the Foundation's 1994 survey of academic research instrumentation needs.

SEC. 9. ASTRONOMY AND ASTROPHYSICS ADVISORY COMMITTEE.

(a) ESTABLISHMENT.—The Foundation and the National Aeronautics and Space Administration shall jointly establish an Astronomy and Astrophysics Advisory Committee (in this section referred to as the "Advisory Committee").

(b) DUTIES.—The Advisory Committee shall—

(1) assess, and make recommendations regarding, the coordination of astronomy and astrophysics programs of the Foundation and the National Aeronautics and Space Administration;

(2) assess, and make recommendations regarding, the status of the activities of the Foundation and the National Aeronautics and Space Administration as they relate to the recommendations contained in the National Research Council's 2001 report entitled "Astronomy and Astrophysics in the New Millennium", and the recommendations contained in subsequent National Research Council reports of a similar nature; and

(3) not later than March 15 of each year, transmit a report to the Director, the Administrator of the National Aeronautics and Space Administration, and the Congress on the Advisory Committee's findings and recommendations under paragraphs (1) and (2).

(c) MEMBERSHIP.—The Advisory Committee shall consist of 13 members, none of whom shall be a Federal employee, including—

(1) 5 members selected by the Foundation;

(2) 5 members selected by the National Aeronautics and Space Administration; and

(3) 3 members selected by the members selected under paragraphs (1) and (2).

(d) SELECTION PROCESS.—Initial selections under subsection (c)(1) and (2) shall be made within 3 months after the date of the enactment of this Act. Initial selections under subsection (c)(3) shall be made within 5 months after the date of the enactment of this Act. Vacancies shall be filled in the same manner as provided in subsection (c).

(e) CHAIRPERSON.—The Advisory Committee shall select a chairperson from among its members.

(f) COORDINATION.—The Advisory Committee shall coordinate with the advisory bodies of other Federal agencies, such as the Department of Energy, which may engage in related research activities.

(g) COMPENSATION.—The members of the Advisory Committee shall serve without compensation, but shall receive travel expenses, including per diem in lieu of subsistence, in accordance with sections 5702 and 5703 of title 5, United States Code.

(h) MEETINGS.—The Advisory Committee shall convene, in person or by electronic means, at least 4 times a year.

(i) QUORUM.—

(1) IN GENERAL.—Except as provided in paragraph (2), a majority of the members serving on the Advisory Committee shall constitute a quorum for purposes of conducting the business of the Advisory Committee.

(2) EXCEPTION.—The selection of a member under subsection (c)(3) shall require a vote of ¾ of the members appointed under subsection (c)(1) and (2).

(j) DURATION.—Section 14 of the Federal Advisory Committee Act shall not apply to the Advisory Committee.

SEC. 10. BOARD MEETINGS.

(a) PURPOSE.—The purpose of this section is to ensure that the Board complies with the requirements of section 552b of title 5, United States Code, that all meetings, with the exception of specific narrow statutory exemptions, be open to the public.

(b) COMPLIANCE AUDIT.—The Inspector General of the National Science Foundation shall conduct an annual audit of the compliance by the Board with the requirements described in subsection (a). The audit shall examine the extent to which the proposed and actual content of closed meetings is consistent with those requirements.

(c) REPORT.—Not later than February 15 of each year, the Inspector General of the National Science Foundation shall transmit to the Congress the audit required under subsection (b) along with recommendations for corrective actions that need to be taken to achieve fuller compliance with the requirements described in subsection (a), and recommendations on how to ensure public access to the Board's deliberations.

II. PURPOSE OF THE BILL

The purpose of the bill is to authorize funding for the National Science Foundation (NSF) for fiscal years 2003, 2004, and 2005,

and to impose requirements related to major research facilities funded by the Foundation, interagency coordination of astronomy research, and public access to meetings of the National Science Board (NSB).

III. Background and Need for the Legislation

NSF is an independent federal agency created by the National Science Foundation Act of 1950 (P.L. 81–507). NSF's mission is unique among the federal governments's scientific research agencies in that it is to support science and engineering across all disciplines. NSF currently funds research and education activities at more than 2,000 universities, colleges, K–12 schools, businesses, and other research institutions throughout the United States. Virtually all of this support is provided through competitive, merit-reviewed grants and cooperative agreements. Although NSF's research and development budget accounts for only about 4 percent of all federally funded research, the role of NSF in promoting fundamental research is vital to the nation's scientific enterprise, as NSF provides approximately 25 percent of the federal support for basic research conducted at academic institutions.

Basic research pays enormous dividends to society. Economic growth, public health, national defense, and social advancement have all been tied to technological developments resulting from research and development. In fact, economists estimate that innovation and the application of new technology have generated at least half of the phenomenal growth in America's gross domestic product since World War II. As Allan Bromley, science advisor to former President George H.W. Bush, put it, "No science, no surplus. It's that simple."

Though NSF-funded research has had a tremendous impact on society, funding for NSF has not been sufficient to maximize the agency's potential contribution to the nation's research enterprise. NSF is currently able to fund only about one third of the grant proposals submitted because of limited funds; 13 percent of top rated grant applications are not funded. More funding for basic science is needed to feed the innovation pipeline and to ensure future economic growth, as well as to strengthen homeland defense and national security.

NSF was most recently authorized by the National Science Foundation Act of 1998, which authorized appropriations for NSF for fiscal year (FY) 1998, FY 1999, and FY 2000. In addition to the lapse in authorizations of appropriations for the agency, several policy issues—including ones related to the Foundation's responsibilities for large scale research facilities—have arisen since the 1998 Act expired.

IV. Summary of Hearings

On Thursday, September 5, 2001, the Subcommittee on Research of the Committee on Science held a hearing on NSF's Major Research Equipment (MRE) [now called the Major Research Equipment and Facilities Construction (MREFC)] portfolio to clarify the process by which MRE projects are approved and funded and to discuss NSF's Large Facility Projects Management and Oversight Plan drafted in response to concerns from the NSF Inspector Gen-

eral (IG) and the Office of Management and Budget. The scientific community has also raised concerns about the adequacy of NSF's planning and management of large research facilities. The hearing witnesses included the Director of NSF, the Vice Chair of the NSB, and the NSF IG. Witness testimony described the process by which these projects are selected for funding as well as agency oversight during implementation and operation of these facilities.

On Wednesday, March 13, 2002, the Subcommittee on Research of the Committee on Science held a hearing to receive testimony on ways to determine appropriate funding levels for NSF. The hearing witnesses included academic researchers representing a wide range of scientific and engineering fields, as well as a representative from industry. The hearing addressed the criteria that should be used in setting NSF budget levels and priorities within the budget, the balance within the federal R&D portfolio, and the impact of NSF funding levels on researchers in academia and industry and on the economy. Witness testimony focused on the current funding level, which was deemed inadequate, relationships between basic research and corporate success, and the disparity between biomedical and physical science funding.

On Thursday, May 9, 2002, the Subcommittee on Research of the Committee on Science held a hearing to receive testimony on H.R. 4664, the National Science Foundation Authorization Act of 2002. Witnesses testified on the legislation, which provides authorizations for NSF for fiscal years 2003, 2004, and 2005, as well as policy provisions related to major research facilities funded by the Foundation, interagency coordination of astronomy research, and public access to meetings of the NSB. The Committee heard from the Dean of the School of Engineering at Tufts University, a Professor of Physics at Massachusetts Institute of Technology, and the President of the University of Maryland. The witnesses stated that the increase in funding for NSF contained in H.R. 4664 is needed to establish programs and develop teaching tools and curriculum to improve K–12 science, math, and engineering education; to attract more students to the sciences, math, and engineering disciplines; to address the shortage of science- and engineering-literate workers; to re-energize the physical sciences; and, in general, to maintain the research enterprise that feeds the innovation pipeline.

V. Committee Actions

On May 7, 2002, Research Subcommittee Chairman Nick Smith, Full Committee Chairman Sherwood Boehlert, Full Committee Ranking Member Hall, and Ranking Research Subcommittee Member Eddie Bernice Johnson introduced H.R. 4664, the National Science Foundation Authorization Act of 2002, a bill to authorize appropriations for fiscal years 2003, 2004, and 2005 for NSF.

The Subcommittee on Research met on Thursday, May 9, 2002, to consider the bill. An amendment was offered by Chairman Boehlert that changed the title of the bill to the Investing in America's Future Act of 2002. The amendment was adopted by a voice vote. With a quorum present, Ms. Eddie Bernice Johnson moved that the Subcommittee favorably report the bill, H.R. 4664, as amended, to the Full Committee on Science with the recommendation that it be in order for the amendment, adopted by the Subcommittee, to be considered as an original bill for the purpose of amendment under

the five minute rule at Full Committee, and that staff be instructed to make technical and conforming changes to the bill as amended. The motion was agreed to by a voice vote.

The Full Committee on Science met on Wednesday, May 22, 2002, to consider the bill. An Amendment was offered by Chairman Boehlert, which made technical changes to the bill and added provisions providing specific authorizations for the Advanced Technical Education Program and the Minority Serving Institutions Undergraduate Program. The amendment was adopted by a voice vote. With a quorum present, Mr. Hall moved that the Committee favorably report the bill, H.R. 4664, as amended, to the House with the recommendation that the bill as amended do pass, and that the staff be instructed to make technical and conforming changes to the bill as amended and prepare the legislative report and that the Chairman take all necessary steps to bring the bill before the House for consideration. The motion was agreed to by a voice vote.

VI. Summary of Major Provisions of the Bill

- Authorizes appropriations for NSF of $5,515,260,000 for FY 2003, $6,342,550,000 for FY 2004, and $7,293,930,000 for FY 2005.
- Requires the Director to develop a list of proposed MREFC projects, ranking the relative priority of each for funding. Requires the Director to submit the list to Congress, upon approval of the list by the NSB, along with a report describing how the projects were prioritized. Prohibits obligation of MREFC funds until 30 days after the report is submitted to Congress.
- Requires the Director to submit to the Congress annually a plan for the allocation of appropriated funds for activities authorized by this Act for the corresponding fiscal year.
- Requires the Director to prepare, and include as part of the Foundation's annual budget request to Congress, a plan for the proposed construction of, and repair and upgrades to, national research facilities, including full life-cycle cost information.
- Requires the Director to conduct a review and assessment of the Major Research Instrumentation (MRI) program and provide a report to Congress.
- Directs the Foundation and the National Aeronautics and Space Administration (NASA) to jointly establish an Astronomy and Astrophysics Advisory Committee to assess and provide recommendations regarding the coordination of astronomy and astrophysics programs at each agency and the status of each agency's activities. Requires the Committee to transmit, on a yearly basis, a report on its fundings and recommendations to the Director of the Foundation, the Administrator of NASA, and the Congress.
- Requires the NSF IG to conduct an annual audit of the compliance of the NSB with the requirements of section 552b of title 5, U.S. Code, which requires that a federal advisory committee's meetings be open to the public, and to report to Congress on the findings of the audit as well as any recommendations.

VII. Section-by-Section Analysis (by Title and Section)

SECTION 1. SHORT TITLE

"Investing in America's Future Act of 2002."

SECTION 2. DEFINITIONS

Defines "Board" as the National Science Board established under section 2 of the National Science Foundation Act of 1950. Defines "Director" as the Director of the National Science Foundation. Defines "Foundation" as the National Science Foundation. Uses the definition for "Institution of Higher Education" found in the Higher Education Act of 1965. Defines "National Research Facility" as a research facility funded by the Foundation that is available for use by all scientists and engineers affiliated with research institutions in the United States. Defines "United States" as the States, terrorities, and possessions of the United States.

SECTION 3. AUTHORIZATION OF APPROPRIATIONS

Authorizes appropriations for NSF of $5,515,260,000 for FY 2003; $6,342,550,000 for FY 2004; and $7,293,930,000 for FY 2005.

SECTION 4. OBLIGATION OF MAJOR RESEARCH AND FACILITIES CONSTRUCTION FUNDS.

Prohibits NSF from obligating funds authorized for the MREFC account in FY 2003 until 30 days after the first report required under section 6 is transmitted to Congress. Correspondingly prohibits obligation of funds for the MREFC account in FY 2004 and 2005 until updated versions of the same report have been submitted to Congress.

SECTION 5. ANNUAL PLAN FOR ALLOCATION OF FUNDING

Requires that the Director submit a yearly plan, subsequent to the passage of legislation providing appropriations for NSF, describing the allocation of funds for activities authorized for the corresponding fiscal year. Requires for the Research and Related Activities account, a description of how the allocation of funding (1) will affect the average size and duration of research grants supported by the Foundation; (2) will affect trends in research support for major fields and sub-fields of science, mathematics, and engineering, including for emerging multi-disciplinary research areas; and (3) is designed to achieve an appropriate balance among major fields and subfields of science, mathematics, and engineering.

SECTION 6. PROPORTIONAL REDUCTION

Requires that, if the overall amount appropriated for the Foundation is less than the amount authorized, the amount available for each Foundation account be reduced by the same proportion. Similarly, requires that any amounts appropriated for the specifically-mentioned Research and Related Activities (RRA) sub-activities (information technology research, the Nanoscale Science and Engineering and the Mathematical Sciences priority areas, MRI) be reduced by the same proportion if the amount appropriated for the RRA account is less than the amount authorized.

SECTION 7. NATIONAL RESEARCH FACILITIES

Requires the Director to submit to the Congress a report containing a list developed by the Director and approved by the Board ranking by number the relative priority for projects proposed to be

funded under the MREFC account. Also requires that a description of the criteria used to develop the list, and a description of the major factors for each project that determined its ranking on the list, be provided.

Amends section 201 of the National Science Foundation Authorization Act of 1998 to (1) require the annual report on national research facilities to be included as part of the Foundation's annual budget request to Congress and contain full life-cycle cost information, and (2) define "full life-cycle cost" as all costs of development, procurement, construction, operations and support, and shut down costs, without regard to funding source and without regard to what entity manages the project. Also requires that national research facility projects funded under the MREFC account be managed by individuals whose appointments to the Foundation are not temporary.

SECTION 8. MAJOR RESEARCH INSTRUMENTATION

Requires the Director to conduct a review and assessment of the MRI program and provide a report to Congress. The report is to include estimates of the needs of institutions of higher education for research instrumentation by major field of science and engineering; the distribution of awards and funding levels by year and by major field for the MRI program; and an analysis of the impact of the MRI program on the research instrumentation needs that were documented in the Foundation's 1994 survey of academic research instrumentation needs.

SECTION 9. ASTRONOMY AND ASTROPHYSICS ADVISORY COMMITTEE

Directs the Foundation and NASA to jointly establish as Astronomy and Astrophysics Advisory Committee to assess and provide recommendations regarding the coordination of astronomy and astrophysics programs at each agency and the status of each agency's activities as they relate to the recommendations contained in the National Research Council's 2001 report entitled Astronomy and Astrophysics in the New Millennium. Requires the Committee to transmit, on a yearly basis, a report on its findings and recommendations to the Director of the Foundation, the Administrator of NASA, and the Congress.

SECTION 10. BOARD MEETINGS

Requires the NSF IG to conduct an annual audit of the compliance of the NSB with the requirements of section 552b of title 5, U.S. Code to determine wither the Board is in compliance with the administrative requirements of the Act, which requires that a federal advisory committee's meetings be open to the public, and to report to Congress on the findings of the audit as well as any recommendations.

VIII. COMMITTEE VIEWS

Grant award issues

The Committee believes that the current size and duration of many NSF awards is insufficient to fully fund many research projects from start to finish. The average NSF grant in FY 2001 was $112,000 and lasted 2.9 years. The Committee is concerned

that many researchers are spending inordinate amounts of time applying for grants and attempting to piece together the funds necessary for research projects, including funding for the students, postdoctoral fellows, and staff who work on these projects. In addition, the Committee is concerned that the relatively short grant duration often precludes or makes exceedingly difficult the planning of long-term projects, including those that involve researchers from different disciplines. The Committee intends for NSF to increase the size and time period of grant awards, thus allowing researchers more time to engage in research activities and teaching.

At the same time, the Committee recognizes the importance of ensuring that an increase in grant size and duration does not come at the expense of awarding additional grants. Currently, NSF is forced to decline support for significant numbers of highly rated grant applications because funds for them do not exist. NSF funds only about a third of the grant applications it receives, and 13 percent of the grant applications rated most highly by merit review committees go unfunded. The Committee is particularly concerned that scarce amounts of funding may be driving researchers to become overly conservative and to avoid high risk/high payoff research, or simply to leave certain fields altogether. The committee believes that the increases provided in the Investing in America's Future Act of 2002 for the RRA account—15 percent in FY 2003, 14 percent in 2004, and 15 percent in 2005—will enable the Foundation to significantly increase grant size and duration while at the same time awarding the same or greater numbers of total grants.

Balance in the federal research and development portfolio

The Committee is concerned that there may be an imbalance in federal funding between the biomedical sciences and other fields of science, mathematics, and engineering. Over the past decade, total federal funding for the physical sciences has remained essentially flat while funding for the biomedical sciences has skyrocketed. In fact, a recent National Academy of Sciences report found that the total amount of federal support for physics research declined 24.6 percent in real dollars between 1992 and 1998. In contrast, funding for biomedical research increased 36 percent over the same time period and an additional 85 percent between 1999 and 2002. Funding for biomedical research currently amounts for more than 50 percent of total civilian research.

Underfunding one major area of science can be detrimental to well funded areas, since the latter cannot draw on important innovations that would potentially be produced by the former. For example, if NSF had not funded the research that led to the discovery of nuclear magnetic resonance, magnetic resonance imaging (MRI) technology, which is used to detect tumors and internal tissue damage in patients and to investigate differences in brain tissue, might not be available today. Other significant inventions that stemmed from discoveries made by NSF-funded researchers and spurred discoveries in other fields include the Internet, fiber optics, Doppler radar, bar codes, data compression technology, edible vaccines, automated DNA sequencers, and nanotechnology.

While the Committee is of the opinion that the mathematical, physical, and information sciences and engineering disciplines have been significantly underfunded, the Committee also recognizes that

greater funding for other disciplines, including the non-biomedical life sciences and the social sciences is also necessary. While the Committee gives NSF the responsibility to determine funding levels among the different directorates and divisions, the Committee strongly believes that all disciplines for which NSF provides support should receive significant budget increases. The authorizations provided by the Investing in America's Future Act of 2002 provide sufficient funds to allow these increases across all fields funded by the Foundation.

Funding for core and priority research programs

Research within the RRA account can be analyzed in terms of "core" research activities, which describes research that fits within a particular discipline, such as astronomy, chemistry, mathematics, and "priority areas" which are multi-disciplinary research area that cut across directorates. The Committee urges NSF to carefully evaluate the balance between the core and priority research areas, and ensure that funding for core research remains strong.

Investments in selected priority areas

The Committee applauds the Foundation's efforts to bring together scientists from diverse and sometimes seemingly unrelated disciplines to study topics of national interest and/or emerging disciplines. The Committee encourages NSF to continue to promote collaborations between researchers in diverse fields as well as in different sub-fields.

The Committee has strongly supported and made information technology research a priority for over a decade. Last year, the Committee passed H.R. 3400, the Networking and Information Technology Research Advancement Act, which authorized funds for networking and information technology research at NSF—in coordination with other federal agencies—in keeping with the High Performance Computing Act of 1991. Continuing the pace of information technology research is becoming increasingly difficult. For example, as semiconductors become ever smaller, faster, and cheaper, the physical limits of the processes used to make them are rapidly approaching. Future research breakthroughs are needed to ensure that semiconductor memory costs will continue to decrease, while microprocessor speed continues to increase. The benefits to the national economy from these productivity improvements promise to far exceed the added investments in basic science required to realize them.

In addition to the priority areas specifically authorized in the bill, the Committee fully supports the NSF budget proposal for the new priority area in the Social, Behavioral and Economic Sciences included in the FY 2003 budget request. These sciences are poised to take advantage of new tools, larger grants, and multidisciplinary cooperation to explore the social and behavioral aspects of many fundamental human and societal questions, such as: how people learn; how children develop; the ethical, legal, and social implications of technological advances; geographic patterns and processes; and innovation and change in organizations and firms. The Committee encourages NSF to sustain and provide for future growth for this initiative.

Also, the Committee supports the FY 2003 budget request for Biocomplexity and the Environment, which provides a focal point for scientists from different disciplines to work together to understand complex environmental systems, including the roles of humans in shaping these systems. This priority area has promise for leading to a comprehensive understanding of interrelationships that arise when living things interact with their environment at all levels, from molecular structures to genes to organisms to ecosystems to urban centers.

Education and human resources

The Committee believes that the science, technology, and mathematics education programs supported by NSF are critical to stimulating education reform in the United States. The education initiatives authorized in Committee-generated legislation aimed at improving K–12 and undergraduate science, mathematics, engineering, and technology education, H.R. 1858 and H.R. 3130, respectively, will strengthen these efforts further. The Committee expects funds authorized by this Act to fund programs authorized by H.R. 1858 and H.R. 3130.

Advanced Technological Education program

The Committee intends that the funding increase above the FY 2002 appropriations level provided by this authorization for the Advanced Technological Education (ATE) program be used for existing activities under the program and for funding the activities authorized under section 13 of the Undergraduate Science, Mathematics, Engineering and Technology Education Improvement Act, H.R. 3130, as reported by the Sciences Committee.

Minority Serving Institutions

The authorization of appropriations for Education and Human Resources for FY 2003 designates $30 million for the Minority Serving Institutions Undergraduate Program, which is established under section 12 of the Undergraduate Science, Mathematics, Engineering and Technology Education Improvement Act, H.R. 3130, as reported by the Science Committee. The Committee intends that the Minority Serving Institutions Undergraduate Program encompass the existing Historically Black Colleges and Universities-Undergraduate Program (HBCU–UP) and Tribal Colleges and Universities Program as well as the newly created programs for Hispanic-Serving Institutions, Alaska Native-Serving Institutions, and Native Hawaiian-Serving Institutions. The new Minority Serving Institutions Undergraduate Program should have the same overall goals and objectives as HBCU–UP. The Committee expects the Program to continue beyond FY 2003 and to be funded at a level consistent with meeting its goals.

National research facilities

The Committee strongly believes that cutting-edge, world-class research requires not only talented scientists and engineers, but also a state-of-the art science and engineering infrastructure. In addition, the Committee believes that providing scientists and engineers with the necessary equipment and facilities is part of NSF's mission. Therefore, it is the Committee's intent that the funding in-

creases authorized for MREFC be used to reduce the backlog of large research and equipment facilities construction projects approved by the NSB and awaiting funding.

Prioritization and selection of major research equipment and facilities awards

The Committee continues to be concerned that the lack of transparency in the MREFC planning, evaluation, prioritization and selection process has caused uncertainty and confusion about the prospect for the funding of major facilities. In section 7(a), the Committee has specified a process for the prioritization and selection of MREFC projects. As part of this process, the Director is to develop a list of the proposed projects, ranking the relative priority of each for funding, and submit the list of the Board for review. The list, which must be submitted to Congress, must first be approved by the NSB. The Committee expects that, while the Board has final say on the ranking of the items on the list, the list submitted to Congress is acceptable to both the Director and the Board. The list submitted to Congress must also be accompanied by a report describing how the projects were prioritized. The Committee expects the report to include: (1) a detailed description of the criteria used to develop the list and (2) a description of the major factors for each project that determined its ranking on the list.

Because of its concern about the lack of transparency in the planning, evaluation, prioritization, and selection of MREFC awards, the Committee has included a requirement, as specified in section 4 of the Act, prohibiting the obligation of any appropriate MREFC account funds for FY 2003 until 30 days after the Director has submitted to the Congress the report specified in section 7(a). While the Committee realizes that the Director will have a limited amount of time in which to fulfill these requirements so that funds appropriated for FY 2003 can be obligated in a timely manner, the Committee believes that it is essential that transparency be added to the process before additional awards are made. It is the Committee's intention that the ranked list, due by June 15 in subsequent years, be used by the Foundation in formulating the next years' budget request (e.g. the list submitted this year shall be used to inform the FY 2004 budget process), and the Committee expects an explanation of any deviations from the NSB-approved list contained in the corresponding budget request.

Plan for costs associated with national research facilities

In section 7(b), the Committee has modified the requirement for the annual submittal to Congress of a plan for national research facilities enacted by the National Science Foundation Authorization Act of 1998, a requirement with which NSF has never fully complied. The Committee intends that this document provide a full description of the Foundation's plan for the proposed construction of, and repair and upgrades to, national research facilities, including full life-cycle cost information. Also, the Committee realizes that estimated funding profiles for projects in the earlier stages of development are subject to change. However, the Committee seeks information about potential resource requirements for infrastructure

improvements and expects estimated schedule and cost profiles to be included for all projects under consideration.

In addition to information on construction plans, the plan should include a status report on all construction projects currently underway. The purpose of the reporting requirement is to formally document the status of construction projects, including the total funding allocated to each project from all federal and non-federal sources, and to reinforce the Committee's view on the need for high level management attention at NSF to major facilities construction projects. Also, the report is expected to provide the Committee with information on the phasing out of existing facilities and with estimates of the funding planned to support research that will make use of national facilities. The Committee also continues to expect that NSF will inform the Committee, at the time they are identified, of problems that will significantly impact cost or schedule for major construction projects.

Management of MREFC projects

As indicated in section 7(c), the Committee has included a requirement precluding the Foundation's use of temporary employees to manage national research projects funded under the MREFC account. Such projects span multiple years, are complex, and usually involve several phases of design and implementation, construction, and operation. The Committee believes management continuity will help project delays and cost overruns.

It is not the intention of the Committee to restrict the use of temporary employees over all the Foundation's programs. The Committee recognizes that a number of management positions at NSF are held by temporary employees who come from colleges, universities, the private sector, and other government agencies to work at NSF for three years or less. This practice is beneficial to the agency because it brings researchers from colleges and universities to work for a few years at the Foundation, thereby drawing on their in-depth and cutting edge knowledge of a particular field of research. However, the Committee believes that the assignment of temporary employees to long-term projects is not in the best interests of those projects or the Foundation.

Major research instrumentation

The MRI program was initiated in FY 1994 to enable academic institutions to acquire research instrumentation too expensive to be bought with funds from a standard research grant. The Foundation's periodic surveys of instrumentation needs at academic institutions provided the rationale for the MRI program. The last such survey in 1994 found that 42 percent of respondents (1) judged their instrumentation to be "inadequate or poor" for enabling them to pursue their major research interests using existing research facilities, and (2) estimated that it would cost $1.4 billion to bring their research instrumentation to an adequate level.

Between FY 1994 and FY 2000, the MRI program was funded at $50 million per year. Congress raised the appropriation for MRI to $75 million for both FY 2001 and FY 2002, despite continued NSF requests for $50 million for the program. The bill authorizes funding for FY 2003 at the FY 2002 appropriations level and increases the authorization to $85 million for FY 2004.

In light of the 1994 report, the MRI funding level appears to be insufficient to effect significant improvements in the program. The Committee supports growth in the MRI program, but is hampered in setting the appropriate funding level by insufficient information on the current state of research instrumentation needs by academic institutions because NSF has not repeated its instrumentation surveys since the one in 1994.

The Committee expects NSF, in accordance with section 8 of the bill, to assess the MRI program's impact on the instrumentation needs identified by the 1994 survey, by field of science and engineering. The Committee also has specified that NSF carry out a new instrumentation survey to provide a basis for determining the scale of current research instrumentation needs at academic institutions across fields of science and engineering. The Committee expects NSF to use the results of the survey to make appropriate changes in the scope and scale of the MRI program.

Astronomy and Astrophysics Advisory Committee

The Committee expects NSF and NASA to coordinate their respective plans for research in astronomy and astrophysics and to implement the recommendation of the National Research Council's Committee on the Management of Research in Astronomy and Astrophysics for establishment of an advisory committee to help coordinate astronomy and astrophysics programs among federal agencies.

The Committee applauds the efforts of the astronomy and astrophysics research community to carry out a prioritization of its research facilities needs every ten years. The Committee explicitly tasks the advisory committee to review the plans of NSF and NASA in light of the recommendations in the 2001 report of the National Research Council, Astronomy and Astrophysics in the New Millennium, which documents the latest decadal prioritization process.

Board meetings

The Committee is concerned that the meetings of the NSB may not be in full compliance with the Government in the Sunshine Act (P.L. 94–409, now incorporated in section 552b of title 5, U.S. Code), which was intended to make meetings regarding a federal agency's activities open to the public, with narrow statutory exemptions. The Committee expects all NSB meetings to be fully open to the public unless they meet the narrow statutory exemptions specified in the Sunshine Act and are appropriately noticed. To determine whether the Board is complying with the administrative and content requirements of the Sunshine Act, the Committee has included in section 10 a requirement for the NSF IG to conduct an annual audit of the compliance of the NSB with the Act and to report to Congress on its findings as well as any recommendations.

IX. Cost Estimate

A cost estimate and comparison prepared by the Director of the Congressional Budget Office under section 402 of the Congressional Budget Act of 1974 has been timely submitted to the Committee on Science prior to the filing of this report and is included in section X of this report pursuant to House rule XIII, clause 3(c)(3).

H.R. 4664 does not contain new budget authority, credit authority, or changes in revenues or tax expenditures. Assuming that the sums authorized under the bill are appropriated, H.R. 4664 does authorize additional discretionary spending, as described in the Congressional Budget Office report on the bill, which is contained in section X of this report.

X. Congressional Budget Office Cost Estimate

U.S. Congress,
Congressional Budget Office,
Washington, DC, May 31, 2002.

Hon. Sherwood L. Boehlert,
Chairman, Committee on Science,
House of Representatives, Washington, DC.

Dear Mr. Chairman: The Congressional Budget Office has prepared the enclosed cost estimate for H.R. 4664, the Investing in America's Future Act of 2002.

If you wish further details on this estimate, we will be pleased to provide them. The CBO staff contact is Kathleen Gramp.

Sincerely,

Barry B. Anderson
(For Dan L. Crippen, Director).

Enclosure.

H.R. 4664—Investing in America's Future Act of 2002

Summary: H.R. 4664 would authorize the appropriation of $19.2 billion for the activities of the National Science Foundation (NSF) over the 2003–2005 period. If implemented, NSF's appropriation would increase from $4.8 billion in 2002 to $7.3 billion in 2005—an average annual increase of about 15 percent. In addition, the bill would establish an advisory committee on astronomy and astrophysics, which would be jointly administered by NSF and the National Aeronautics and Space Administration.

Assuming appropriation of the specified amounts, CBO estimates that implementing this bill would cost $17.5 billion over the 2003–2007 period. The bill would not affect direct spending or receipts; therefore, pay-as-you-go procedures would not apply.

H.R. 4664 contains no intergovernmental or private-sector mandates as defined in the Unfunded Mandates Reform Act (UMRA) and would impose no costs on state, local, or tribal governments. The bill would benefit public universities by authorizing substantial grant funding to institutions of higher education, including public universities, for scientific and technical education. Any costs incurred by public universities would be voluntary.

Estimated cost to the Federal Government: The estimated budgetary impact of H.R. 4664 is shown in the following table. For this estimate, CBO assumes that the amounts authorized will be appropriated each year and that outlays will occur at rates similar to those of existing NSF programs. The costs of this legislation fall within budget function 250 (general science, space, and technology).

	By fiscal year, in millions of dollars—					
	2002	2003	2004	2005	2006	2007
SPENDING SUBJECT TO APPROPRIATION						
NSF spending under current law:						
Budget authority [1]	4,789	0	0	0	0	0
Estimated outlays	4,141	3,221	1,121	327	124	45
Proposed changes:						
Authorization level [1]	0	5,515	6,343	7,294	0	0
Estimated outlays	0	1,389	4,108	5,659	4,703	1,646
NSF spending under H.R. 4664:						
Authorization level [1]	4,789	5,515	6,343	7,294	0	0
Estimated outlays	4,141	4,610	5,229	5,986	4,827	1,691

[1] The 2002 level is the amount appropriated for that year.

Pay-as-you-go considerations: None.

Estimated impact on state, local, and tribal governments: H.R. 4664 contains no intergovernmental mandates as defined in UMRA and would impose no costs on state, local, or tribal governments. The bill would benefit public universities by authorizing substantial grant funding to institutions of higher education, including public universities, for scientific and technical education. Any costs incurred by public universities would be voluntary.

Estimated impact on the private sector: This bill contains no new private-sector mandates as defined in UMRA.

Estimate prepared by: Federal costs: Kathleen Gramp; impact on state, local, and tribal governments: Elyse Goldman; impact on the private sector: Patrice Gordon.

Estimate approved by: Peter H. Fontaine, Deputy Assistant Director for Budget Analysis.

XI. Compliance With Public Law 104–4

H.R. 4664 contains no unfunded mandates.

XII. Committee Oversight Findings and Recommendations

The Committee on Science's oversight findings and recommendations are reflected in the body of this report.

XIII. Statement on General Performance Goals and Objectives

Pursuant to clause (3)(c)(4) of House rule XIII, the goals and objectives of H.R. 4664 are to authorize appropriations for NSF for fiscal years 2003, 2004, and 2005, and to impose requirements related to major research facilities funded by the Foundation, interagency coordination of astronomy research, and public access to meetings of the NSB.

XIV. Constitutional Authority Statement

Article I, section 8 of the Constitution of the United States grants Congress the authority to enact H.R. 4664.

XV. Federal Advisory Committee Statement

The functions of the advisory committee established by H.R. 4664 are not currently being nor could they be performed by one or more agencies or by enlarging the mandate of another existing advisory committee.

XVI. CONGRESSIONAL ACCOUNTABILITY ACT

The Committee finds that H.R. 4664 does not relate to the terms and conditions of employment or access to public services or accommodations within the meaning of section 102(b)(3) of the Congressional Accountability Act (Public Law 104–1).

XVII. STATEMENT ON PREEMPTION OF STATE, LOCAL, OR TRIBAL LAW

This bill is not intended to preempt any state, local, or tribal law.

XVIII. CHANGES IN EXISTING LAW MADE BY THE BILL, AS REPORTED

In compliance with clause 3(e) of rule XIII of the Rules of the House of Representatives, changes in existing law made by the bill, as reported, are shown as follows (existing law proposed to be omitted is enclosed in black brackets, new matter is printed in italic, existing law in which no change is proposed is shown in roman):

NATIONAL SCIENCE FOUNDATION AUTHORIZATION ACT OF 1998

* * * * * * *

SEC. 2. DEFINITIONS.

In this Act:

(1) * * *

* * * * * * *

(3) FULL LIFE-CYCLE COST.—The term "full life-cycle cost" means all costs of development, procurement, construction, operations and support, and shut down costs, without regard to funding source and without regard to what entity manages the project.

[(3)**]** *(4)* BOARD.—The term "Board" means the National Science Board established under section 2 of the National Science Foundation Act of 1950 (42 U.S.C. 1861).

[(4)**]** *(5)* UNITED STATES.—The term "United States" means the several States, the District of Columbia, the Commonwealth of Puerto Rico, the Virgin Islands, Guam, American Samoa, the Commonwealth of the Northern Mariana Islands, and any other territory or possession of the United States.

[(5)**]** *(6)* NATIONAL RESEARCH FACILITY.—The term "national research facility" means a research facility funded by the Foundation which is available, subject to appropriate policies allocating access, for use by all scientists and engineers affiliated with research institutions located in the United States.

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TITLE II—GENERAL PROVISIONS

SEC. 201. NATIONAL RESEARCH FACILITIES.

(a) FACILITIES PLAN.—

[(1) IN GENERAL.—Not later than December 1, of each year, the Director shall, as part of the annual budget request, prepare and submit to Congress a plan for the proposed construc-

tion of, and repair and upgrades to, national research facilities.]

(1) IN GENERAL.—The Director shall prepare, and include as part of the Foundation's annual budget request to Congress, a plan for the proposed construction of, and repair and upgrades to, national research facilities, including full life-cycle cost information.

(2) CONTENTS OF THE PLAN.—The plan shall include—

(A) estimates of the costs for the construction, repairs, and upgrades described in paragraph (1)*, including costs for instrumentation development*;

(B) estimates of the costs for the operation and maintenance of existing and proposed new facilities; [and]

(C) in the case of proposed new construction and for major upgrades to existing facilities, funding profiles, by fiscal year, and milestones for major phases of the construction[.]*;*

(D) for each project funded under the Major Research Equipment and Facilities Construction account—

(i) estimates of the total project cost (from planning to commissioning); and

(ii) the source of funds, including Federal funding identified by appropriations category and non-Federal funding;

(E) estimates of the full life-cycle cost of each national research facility;

(F) information on any plans to retire national research facilities; and

(G) estimates of funding levels for grants supporting research that will make use of each national research facility.

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XIX. COMMITTEE RECOMMENDATIONS

On May 22, 2002, a quorum being present, the Committee on Science favorably reported H.R. 4664, the Investing in America's Future Act of 2002, by a voice vote, and recommended its enactment.

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