108TH CONGRESS
1ST SESSION

H. R. 766

IN THE SENATE OF THE UNITED STATES

MAY 8, 2003

Received; read twice and referred to the Committee on Commerce, Science, and Transportation

AN ACT

To provide for a National Nanotechnology Research and Development Program, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. SHORT TITLE.

This Act may be cited as the ''Nanotechnology Research and Development Act of 2003''.

SEC. 2. DEFINITIONS.

In this Act—

(1) the term ''advanced technology user facility'' means a nanotechnology research and development facility supported, in whole or in part, by Federal funds that is open to all United States researchers on a competitive, merit-reviewed basis;

(2) the term ''Advisory Committee'' means the advisory committee established or designated under section 5;

(3) the term ''Director'' means the Director of the Office of Science and Technology Policy;

(4) the term ''Interagency Committee'' means the interagency committee established under section 3(c);

(5) the term ''nanotechnology'' means science and engineering aimed at creating materials, devices, and systems at the atomic and molecular level;

(6) the term ''Program'' means the National Nanotechnology Research and Development Program described in section 3; and

(7) the term ''program component area'' means a major subject area established under section

3(c)(2) under which is grouped related individual projects and activities carried out under the Program.

SEC. 3. NATIONAL NANOTECHNOLOGY RESEARCH AND DEVELOPMENT PROGRAM.

(a) IN GENERAL.—The President shall implement a National Nanotechnology Research and Development Program to promote Federal nanotechnology research, development, demonstration, education, technology transfer, and commercial application activities as necessary to ensure continued United States leadership in nanotechnology research and development and to ensure effective coordination of nanotechnology research and development across Federal agencies.

(b) PROGRAM ACTIVITIES.—The activities of the Program shall be designed to—

(1) provide sustained support for nanotechnology research and development through—

(A) grants to individual investigators and interdisciplinary teams of investigators;

(B) establishment of advanced technology user facilities; and

(C) establishment of interdisciplinary research centers, which shall—

(i) network with each other to foster the exchange of technical information and best practices;

(ii) involve academic institutions or national laboratories and other partners, which may include States and industry;

(iii) make use of existing expertise in nanotechnology in their regions and nationally;

(iv) make use of ongoing research and development at the micrometer scale to support their work in nanotechnology; and

(v) be capable of accelerating the commercial application of nanotechnology innovations in the private sector;

(2) ensure that solicitation and evaluation of proposals under the Program encourage interdisciplinary research;

(3) expand education and training of undergraduate and graduate students in interdisciplinary nanotechnology science and engineering;

(4) accelerate the commercial application of nanotechnology innovations in the private sector;

(5) ensure that societal and ethical concerns, including environmental concerns and the potential

implications of human performance enhancement and the possible development of nonhuman intelligence, will be addressed as the technology is developed by—

(A) establishing a research program to identify societal and ethical concerns related to nanotechnology, and ensuring that the results of such research are widely disseminated;

(B) insofar as possible, integrating research on societal and ethical concerns with nanotechnology research and development, and ensuring that advances in nanotechnology bring about improvements in quality of life for all Americans;

(C) requiring that interdisciplinary research centers under paragraph (1)(C) include activities that address societal and ethical concerns; and

(D) ensure through the National Nanotechnology Coordination Office established under section 6 and through the agencies and departments that participate in the Program, that public input and outreach to the public are both integrated into nanotechnology research and development and research on societal and

ethical concerns by the convening of regular and ongoing public discussions, through mechanisms such as citizens panels, consensus conferences, and educational events, as appropriate; and

(6) include to the maximum extent practicable diverse institutions, including Historically Black Colleges and Universities and those serving large proportions of Hispanics, Native Americans, Asian-Pacific Americans, or other underrepresented populations.

(c) INTERAGENCY COMMITTEE.—The President shall establish or designate an interagency committee on nanotechnology research and development, which shall include representatives from the Office of Science and Technology Policy, the National Science Foundation, the Department of Energy, the National Aeronautics and Space Administration, the National Institute of Standards and Technology, the Environmental Protection Agency, and any other agency that the President may designate. The Director shall select a chairperson from among the members of the Interagency Committee. The Interagency Committee, which shall also include a representative from the Office of Management and Budget, shall oversee the plan-

ning, management, and coordination of the Program. The Interagency Committee shall—

(1) establish goals and priorities for the Program;

(2) establish program component areas, with specific priorities and technical goals, that reflect the goals and priorities established for the Program;

(3) develop, within 6 months after the date of enactment of this Act, and update annually, a strategic plan to meet the goals and priorities established under paragraph (1) and to guide the activities of the program component areas established under paragraph (2);

(4) propose a coordinated interagency budget for the Program that will ensure the maintenance of a balanced nanotechnology research portfolio and ensure that each agency and each program component area is allocated the level of funding required to meet the goals and priorities established for the Program;

(5) develop a plan to utilize Federal programs, such as the Small Business Innovation Research Program and the Small Business Technology Transfer Research Program, in support of the goal stated in subsection (b)(4); and

(6) in carrying out its responsibilities under paragraphs (1) through (5), take into consideration the recommendations of the Advisory Committee, suggestions or recommendations developed pursuant to section 3(b)(5)(D), and the views of academic, State, industry, and other appropriate groups conducting research on and using nanotechnology.

SEC. 4. ANNUAL REPORT.

The chairperson of the Interagency Committee shall prepare an annual report, to be submitted to the Committee on Science of the House of Representatives and the Committee on Commerce, Science, and Transportation of the Senate at the time of the President's budget request to Congress, that includes—

(1) the Program budget, for the current fiscal year, for each agency that participates in the Program, including a breakout of spending for the development and acquisition of research facilities and instrumentation, for each program component area, and for all activities pursuant to section 3(b)(5);

(2) the proposed Program budget, for the next fiscal year, for each agency that participates in the Program, including a breakout of spending for the development and acquisition of research facilities and instrumentation, for each program component

area, and for all activities pursuant to section 3(b)(5);

(3) an analysis of the progress made toward achieving the goals and priorities established for the Program;

(4) an analysis of the extent to which the Program has incorporated the recommendations of the Advisory Committee; and

(5) an assessment of how Federal agencies are implementing the plan described in section 3(c)(5), and a description of the amount of Small Business Innovative Research and Small Business Technology Transfer Research funds supporting the plan.

SEC. 5. ADVISORY COMMITTEE.

(a) IN GENERAL.—The President shall establish or designate an advisory committee on nanotechnology consisting of non-Federal members, including representatives of research and academic institutions and industry, who are qualified to provide advice and information on nanotechnology research, development, demonstration, education, technology transfer, commercial application, and societal and ethical concerns. The recommendations of the Advisory Committee shall be considered by Federal agencies in implementing the Program.

(b) ASSESSMENT.—The Advisory Committee shall assess—

(1) trends and developments in nanotechnology science and engineering;

(2) progress made in implementing the Program;

(3) the need to revise the Program;

(4) the balance among the components of the Program, including funding levels for the program component areas;

(5) whether the program component areas, priorities, and technical goals developed by the Interagency Committee are helping to maintain United States leadership in nanotechnology;

(6) the management, coordination, implementation, and activities of the Program; and

(7) whether societal and ethical concerns, including concerns identified pursuant to section 3(b)(5)(D), are adequately addressed by the Program.

(c) REPORTS.—The Advisory Committee shall report not less frequently than once every 2 fiscal years to the President on its findings of the assessment carried out under subsection (b), its recommendations for ways to improve the Program, and the concerns assessed under sub-

section (b)(7). The first report shall be due within 1 year after the date of enactment of this Act.

(d) FEDERAL ADVISORY COMMITTEE ACT APPLICATION.—Section 14 of the Federal Advisory Committee Act shall not apply to the Advisory Committee.

SEC. 6. NATIONAL NANOTECHNOLOGY COORDINATION OFFICE.

The President shall establish a National Nanotechnology Coordination Office, with full-time staff, which shall—

(1) provide technical and administrative support to the Interagency Committee and the Advisory Committee;

(2) serve as a point of contact on Federal nanotechnology activities for government organizations, academia, industry, professional societies, and others to exchange technical and programmatic information; and

(3) conduct public outreach, including dissemination of findings and recommendations of the Interagency Committee and the Advisory Committee, as appropriate.

SEC. 7. AUTHORIZATION OF APPROPRIATIONS.

(a) NATIONAL SCIENCE FOUNDATION.—There are authorized to be appropriated to the National Science Foundation for carrying out this Act—

(1) $350,000,000 for fiscal year 2004;

(2) $385,000,000 for fiscal year 2005; and

(3) $424,000,000 for fiscal year 2006.

(b) DEPARTMENT OF ENERGY.—There are authorized to be appropriated to the Secretary of Energy for carrying out this Act—

(1) $265,000,000 for fiscal year 2004;

(2) $292,000,000 for fiscal year 2005; and

(3) $322,000,000 for fiscal year 2006.

(c) NATIONAL AERONAUTICS AND SPACE ADMINISTRATION.—There are authorized to be appropriated to the National Aeronautics and Space Administration for carrying out this Act—

(1) $31,000,000 for fiscal year 2004;

(2) $34,000,000 for fiscal year 2005; and

(3) $37,000,000 for fiscal year 2006.

(d) NATIONAL INSTITUTE OF STANDARDS AND TECHNOLOGY.—There are authorized to be appropriated to the National Institute of Standards and Technology for carrying out this Act—

(1) $62,000,000 for fiscal year 2004;

(2) $68,000,000 for fiscal year 2005; and

(3) $75,000,000 for fiscal year 2006.

(e) ENVIRONMENTAL PROTECTION AGENCY.—There are authorized to be appropriated to the Environmental Protection Agency for carrying out this Act—

(1) $5,000,000 for fiscal year 2004;

(2) $5,500,000 for fiscal year 2005; and

(3) $6,000,000 for fiscal year 2006.

SEC. 8. EXTERNAL REVIEW OF THE NATIONAL NANOTECHNOLOGY RESEARCH AND DEVELOPMENT PROGRAM.

(a) IN GENERAL.—Not later than 6 months after the date of enactment of this Act, the Director shall enter into an agreement with the National Academy of Sciences to conduct periodic reviews of the Program. The reviews shall be conducted once every 3 years during the 10-year period following the enactment of this Act. The reviews shall include—

(1) an evaluation of the technical achievements of the Program;

(2) recommendations for changes in the Program;

(3) an evaluation of the relative position of the United States with respect to other nations in nanotechnology research and development;

(4) an evaluation of the Program's success in transferring technology to the private sector;

(5) an evaluation of whether the Program has been successful in fostering interdisciplinary research and development; and

(6) an evaluation of the extent to which the Program has adequately considered societal and ethical concerns.

(b) STUDY ON MOLECULAR MANUFACTURING.—Not later than 3 years after the date of enactment of this Act a review shall be conducted in accordance with subsection (a) that includes a study to determine the technical feasibility of the manufacture of materials and devices at the molecular scale. The study shall—

(1) examine the current state of the technology for enabling molecular manufacturing;

(2) determine the key scientific and technical barriers to achieving molecular manufacturing;

(3) review current and planned research activities that are relevant to advancing the prospects for molecular manufacturing; and

(4) develop, insofar as possible, a consensus on whether molecular manufacturing is technically feasible, and if found to be feasible—

(A) the estimated timeframe in which molecular manufacturing may be possible on a commercial scale; and

(B) recommendations for a research agenda necessary to achieve this result.

(c) STUDY ON SAFE NANOTECHNOLOGY.—Not later than 6 years after the date of enactment of this Act a review shall be conducted in accordance with subsection (a) that includes a study to assess the need for standards, guidelines, or strategies for ensuring the development of safe nanotechnology, including those applicable to—

(1) self-replicating nanoscale machines or devices;

(2) the release of such machines or devices in natural environments;

(3) distribution of molecular manufacturing development;

(4) encryption;

(5) the development of defensive technologies;

(6) the use of nanotechnology as human brain extenders; and

(7) the use of nanotechnology in developing artificial intelligence.

SEC. 9. SCIENCE AND TECHNOLOGY GRADUATE SCHOLARSHIP PROGRAMS.

(a) ESTABLISHMENT OF PROGRAMS.—

(1) IN GENERAL.—The agency heads shall each establish within their respective departments and agencies a Science and Technology Graduate Scholarship Program to award scholarships to individuals that is designed to recruit and prepare students for careers in the Federal Government that require engineering, scientific, and technical training.

(2) COMPETITIVE PROCESS.—Individuals shall be selected to receive scholarships under this section through a competitive process primarily on the basis of academic merit, with consideration given to financial need and the goal of promoting the participation of individuals identified in section 33 or 34 of the Science and Engineering Equal Opportunities Act (42 U.S.C. 1885a or 1885b).

(3) SERVICE AGREEMENTS.—To carry out the Programs the agency heads shall enter into contractual agreements with individuals selected under paragraph (2) under which the individuals agree to serve as full-time employees of the Federal Government, for the period described in subsection (f)(1), in positions needed by the Federal Government and

for which the individuals are qualified, in exchange for receiving a scholarship.

(b) SCHOLARSHIP ELIGIBILITY.—In order to be eligible to participate in a Program, an individual must—

(1) be enrolled or accepted for enrollment as a full-time student at an institution of higher education in an academic field or discipline described in a list made available under subsection (d);

(2) be a United States citizen or permanent resident; and

(3) at the time of the initial scholarship award, not be a Federal employee as defined in section 2105 of title 5 of the United States Code.

(c) APPLICATION REQUIRED.—An individual seeking a scholarship under this section shall submit an application to an agency head at such time, in such manner, and containing such information, agreements, or assurances as the agency head may require.

(d) ELIGIBLE ACADEMIC PROGRAMS.—The agency heads shall each make publicly available a list of academic programs and fields of study for which scholarships under their department's or agency's Program may be utilized, and shall update the list as necessary.

(e) SCHOLARSHIP REQUIREMENT.—

(1) IN GENERAL.—Agency heads may provide scholarships under their department's or agency's Program for an academic year if the individual applying for the scholarship has submitted to the agency head, as part of the application required under subsection (c), a proposed academic program leading to a degree in a program or field of study on a list made available under subsection (d).

(2) DURATION OF ELIGIBILITY.—An individual may not receive a scholarship under this section for more than 4 academic years, unless an agency head grants a waiver.

(3) SCHOLARSHIP AMOUNT.—The dollar amount of a scholarship under this section for an academic year shall be determined under regulations issued by the agency heads, but shall in no case exceed the cost of attendance.

(4) AUTHORIZED USES.—A scholarship provided under this section may be expended for tuition, fees, and other authorized expenses as established by the agency heads by regulation.

(5) CONTRACTS REGARDING DIRECT PAYMENTS TO INSTITUTIONS.—Each agency head may enter into a contractual agreement with an institution of higher education under which the amounts provided

for a scholarship under this section for tuition, fees, and other authorized expenses are paid directly to the institution with respect to which the scholarship is provided.

(f) PERIOD OF OBLIGATED SERVICE.—

(1) DURATION OF SERVICE.—The period of service for which an individual shall be obligated to serve as an employee of the Federal Government is, except as provided in subsection (h)(2), 24 months for each academic year for which a scholarship under this section is provided.

(2) SCHEDULE FOR SERVICE.—(A) Except as provided in subparagraph (B), obligated service under paragraph (1) shall begin not later than 60 days after the individual obtains the educational degree for which the scholarship was provided.

(B) An agency head may defer the obligation of an individual to provide a period of service under paragraph (1) if the agency head determines that such a deferral is appropriate. The agency head shall prescribe the terms and conditions under which a service obligation may be deferred through regulation.

(g) PENALTIES FOR BREACH OF SCHOLARSHIP AGREEMENT.—

(1) FAILURE TO COMPLETE ACADEMIC TRAINING.—Scholarship recipients who fail to maintain a high level of academic standing, as defined by the appropriate agency head by regulation, who are dismissed from their educational institutions for disciplinary reasons, or who voluntarily terminate academic training before graduation from the educational program for which the scholarship was awarded, shall be in breach of their contractual agreement and, in lieu of any service obligation arising under such agreement, shall be liable to the United States for repayment within 1 year after the date of default of all scholarship funds paid to them and to the institution of higher education on their behalf under the agreement, except as provided in subsection (h)(2). The repayment period may be extended by the agency head when determined to be necessary, as established by regulation.

(2) FAILURE TO BEGIN OR COMPLETE THE SERVICE OBLIGATION OR MEET THE TERMS AND CONDITIONS OF DEFERMENT.—Scholarship recipients who, for any reason, fail to begin or complete their service obligation after completion of academic training, or fail to comply with the terms and conditions of deferment established by the appropriate

agency head pursuant to subsection (f)(2)(B), shall be in breach of their contractual agreement. When recipients breach their agreements for the reasons stated in the preceding sentence, the recipient shall be liable to the United States for an amount equal to—

(A) the total amount of scholarships received by such individual under this section; plus

(B) the interest on the amounts of such awards which would be payable if at the time the awards were received they were loans bearing interest at the maximum legal prevailing rate, as determined by the Treasurer of the United States,

multiplied by 3.

(h) WAIVER OR SUSPENSION OF OBLIGATION.—

(1) DEATH OF INDIVIDUAL.—Any obligation of an individual incurred under a Program (or a contractual agreement thereunder) for service or payment shall be canceled upon the death of the individual.

(2) IMPOSSIBILITY OR EXTREME HARDSHIP.—The agency heads shall by regulation provide for the partial or total waiver or suspension of any obliga-

tion of service or payment incurred by an individual under their department's or agency's Program (or a contractual agreement thereunder) whenever compliance by the individual is impossible or would involve extreme hardship to the individual, or if enforcement of such obligation with respect to the individual would be contrary to the best interests of the Government.

(i) DEFINITIONS.—In this section the following definitions apply:

(1) AGENCY HEAD.—The term ''agency head'' means the Director of the National Science Foundation, the Secretary of Energy, the Administrator of the National Aeronautics and Space Administration, the Director of the National Institute of Standards and Technology, or the Administrator of the Environmental Protection Agency.

(2) COST OF ATTENDANCE.—The term ''cost of attendance'' has the meaning given that term in section 472 of the Higher Education Act of 1965 (20 U.S.C. 1087ll).

(3) 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)).

(4) PROGRAM.—The term ''Program'' means a Science and Technology Graduate Scholarship Program established under this section.

Passed the House of Representatives May 7, 2003.

Attest: Jeff Trandahl,

Clerk.