## Union Calendar No.

108th CONGRESS 1st Session

[Report No. 108- ]

H.R.766

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

#### IN THE HOUSE OF REPRESENTATIVES

FEBRUARY 13, 2003

Mr. BOEHLERT (for himself, Mr. HONDA, Mr. EHLERS, Mr. HALL, Mr. SMITH of Michigan, Mr. GORDON, Mrs. BIGGERT, Ms. EDDIE BERNICE JOHNSON of Texas, Mr. BARTLETT of Maryland, Ms. LOFGREN, Mr. GUTKNECHT, and Mr. BISHOP of New York) introduced the following bill; which was referred to the Committee on Science

#### May , 2003

Reported with an amendment, committed to the Committee of the Whole House on the State of the Union and ordered to be printed

[Strike out all after the enacting clause and insert the part printed in italic]

[For text of introduced bill, see copy of bill as introduced on February 13, 2003]

### A BILL

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

Be it enacted by the Senate and House of Representa-

2 tives of the United States of America in Congress assembled,



May 5, 2003 F:\V8\050503\050503.007

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#### 1 SECTION 1. SHORT TITLE.

2 This Act may be cited as the "Nanotechnology Re3 search and Development Act of 2003".

#### 4 SEC. 2. DEFINITIONS.

5 In this Act—

6 (1) the term "advanced technology user facility" 7 means a nanotechnology research and development fa-8 cility supported, in whole or in part, by Federal 9 funds that is open to all United States researchers on 10 a competitive, merit-reviewed basis;

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

14 (3) the term "Director" means the Director of the
15 Office of Science and Technology Policy;

16 (4) the term "Interagency Committee" means the
17 interagency committee established under section 3(c);
18 (5) the term "nanotechnology" means science
19 and engineering aimed at creating materials, devices,
20 and systems at the atomic and molecular level;

21 (6) the term "Program" means the National
22 Nanotechnology Research and Development Program
23 described in section 3; and

(7) the term "program component area" means a major subject area established under section 3(c)(2)



May 5, 2003 F:\V8\050503\050503.007

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1	under which is grouped related individual project	8
2	and activities carried out under the Program.	

# 3 SEC. 3. NATIONAL NANOTECHNOLOGY RESEARCH AND DE 4 VELOPMENT PROGRAM.

5 (a) IN GENERAL.—The President shall implement a National Nanotechnology Research and Development Pro-6 7 gram to promote Federal nanotechnology research, develop-8 ment, demonstration, education, technology transfer, and 9 commercial application activities as necessary to ensure 10 continued United States leadership in nanotechnology research and development and to ensure effective coordination 11 of nanotechnology research and development across Federal 12 13 agencies.

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

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

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

20 (B) establishment of advanced technology
21 user facilities; and

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



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1	(i) network with each other to foster
2	the exchange of technical information and
3	best practices;
4	(ii) involve academic institutions or
5	national laboratories and other partners,
6	which may include States and industry;
7	(iii) make use of existing expertise in
8	nanotechnology in their regions and nation-
9	ally;
10	(iv) make use of ongoing research and
11	development at the micrometer scale to sup-
12	port their work in nanotechnology; and
13	(v) be capable of accelerating the com-
14	mercial application of nanotechnology inno-
15	vations in the private sector;
16	(2) ensure that solicitation and evaluation of
17	proposals under the Program encourage interdiscipli-
18	nary research;
19	(3) expand education and training of under-
20	graduate and graduate students in interdisciplinary
21	nanotechnology science and engineering;
22	(4) accelerate the commercial application of
23	nanotechnology innovations in the private sector;
24	(5) ensure that societal and ethical concerns, in-
25	cluding environmental concerns and the potential im-



1	plications of human performance enhancement and
2	the possible development of nonhuman intelligence,
3	will be addressed as the technology is developed by—
4	(A) establishing a research program to iden-
5	tify societal and ethical concerns related to
6	nanotechnology, and ensuring that the results of
7	such research are widely disseminated;
8	(B) insofar as possible, integrating research
9	on societal and ethical concerns with
10	nanotechnology research and development, and
11	ensuring that advances in nanotechnology bring
12	about improvements in quality of life for all
13	Americans; and
14	(C) requiring that interdisciplinary re-
15	search centers under paragraph $(1)(C)$ include
16	activities that address societal and ethical con-
17	cerns; and
18	(6) include to the maximum extent practicable
19	diverse institutions, including Historically Black Col-
20	leges and Universities and those serving large propor-
21	tions of Hispanics, Native Americans, Asian-Pacific
22	Americans, or other underrepresented populations.
23	(c) INTERAGENCY COMMITTEE.—The President shall
24	establish or designate an interagency committee on
25	nanotechnology research and development, which shall in-



clude representatives from the Office of Science and Tech-1 2 nology Policy, the National Science Foundation, the Department of Energy, the National Aeronautics and Space 3 4 Administration, the National Institute of Standards and 5 Technology, the Environmental Protection Agency, and any other agency that the President may designate. The Director 6 7 shall select a chairperson from among the members of the 8 Interagency Committee. The Interagency Committee, which 9 shall also include a representative from the Office of Man-10 agement and Budget, shall oversee the planning, manage-11 ment, and coordination of the Program. The Interagency Committee shall— 12

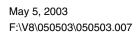
13 (1) establish goals and priorities for the Pro14 gram;

(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





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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 (5) develop a plan to utilize Federal programs,
6 such as the Small Business Innovation Research Pro7 gram and the Small Business Technology Transfer
8 Research Program, in support of the goal stated in
9 subsection (b)(4); and

10 (6) in carrying out its responsibilities under 11 paragraphs (1) through (5), take into consideration 12 the recommendations of the Advisory Committee and 13 the views of academic, State, industry, and other ap-14 propriate groups conducting research on and using 15 nanotechnology.

#### 16 SEC. 4. ANNUAL REPORT.

17 The chairperson of the Interagency Committee shall 18 prepare an annual report, to be submitted to the Committee 19 on Science of the House of Representatives and the Com-20 mittee on Commerce, Science, and Transportation of the 21 Senate at the time of the President's budget request to Con-22 gress, 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 devel-



1	opment and acquisition of research facilities and in-
2	strumentation, for each program component area, and
3	for all activities pursuant to section 3(b)(5);
4	(2) the proposed Program budget, for the next
5	fiscal year, for each agency that participates in the
6	Program, including a breakout of spending for the de-
7	velopment and acquisition of research facilities and
8	instrumentation, for each program component area,
9	and for all activities pursuant to section $3(b)(5)$ ;
10	(3) an analysis of the progress made toward
11	achieving the goals and priorities established for the
12	Program;
13	(4) an analysis of the extent to which the Pro-
14	gram has incorporated the recommendations of the
15	Advisory Committee; and
16	(5) an assessment of how Federal agencies are
17	implementing the plan described in section $3(c)(5)$ ,
18	and a description of the amount of Small Business
19	Innovative Research and Small Business Technology
20	Transfer Research funds supporting the plan.
21	SEC. 5. ADVISORY COMMITTEE.
22	(a) IN GENERAL.—The President shall establish or des-
23	ignate an advisory committee on nanotechnology consisting
24	of non-Federal members, including representatives of re-



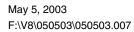




qualified 1 provide advice and information toon 2 nanotechnology research, development, demonstration, edu-3 cation, technology transfer, commercial application, and so-4 cietal and ethical concerns. The recommendations of the Ad-5 visory Committee shall be considered by Federal agencies in implementing the Program. 6

- 7 (b) ASSESSMENT.—The Advisory Committee shall
  8 assess—
- 9 (1) trends and developments in nanotechnology
  10 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;
- 16 (5) whether the program component areas, prior17 ities, and technical goals developed by the Interagency
  18 Committee are helping to maintain United States
  19 leadership in nanotechnology;
- 20 (6) the management, coordination, implementa21 tion, and activities of the Program; and
- (7) whether societal and ethical concerns are adequately addressed by the Program.
- 24 (c) REPORTS.—The Advisory Committee shall report
  25 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 im prove 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.

6 (d) FEDERAL ADVISORY COMMITTEE ACT APPLICA7 TION.—Section 14 of the Federal Advisory Committee Act
8 shall not apply to the Advisory Committee.

### 9 SEC. 6. NATIONAL NANOTECHNOLOGY COORDINATION OF-10 FICE.

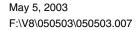
11 The President shall establish a National
12 Nanotechnology Coordination Office, with full-time staff,
13 which shall—

14 (1) provide technical and administrative support
15 to the Interagency Committee and the Advisory Com16 mittee;

17 (2) serve as a point of contact on Federal
18 nanotechnology activities for government organiza19 tions, academia, industry, professional societies, and
20 others to exchange technical and programmatic infor21 mation; and

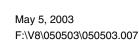
(3) conduct public outreach, including dissemination of findings and recommendations of the Interagency Committee and the Advisory Committee, as
appropriate.





1	SEC. 7. AUTHORIZATION OF APPROPRIATIONS.
2	(a) NATIONAL SCIENCE FOUNDATION.—There are au-
3	thorized to be appropriated to the National Science Foun-
4	dation for carrying out this Act—
5	(1) \$350,000,000 for fiscal year 2004;
6	(2) \$385,000,000 for fiscal year 2005; and
7	(3) \$424,000,000 for fiscal year 2006.
8	(b) Department of Energy.—There are authorized
9	to be appropriated to the Secretary of Energy for carrying
10	out this Act—
11	(1) \$265,000,000 for fiscal year 2004;
12	(2) \$292,000,000 for fiscal year 2005; and
13	(3) \$322,000,000 for fiscal year 2006.
14	(c) NATIONAL AERONAUTICS AND SPACE ADMINISTRA-
15	TION.—There are authorized to be appropriated to the Na-
16	tional Aeronautics and Space Administration for carrying
17	out this Act—
18	(1) \$31,000,000 for fiscal year 2004;
19	(2) \$34,000,000 for fiscal year 2005; and
20	(3) \$37,000,000 for fiscal year 2006.
21	(d) National Institute of Standards and Tech-
22	NOLOGY.—There are authorized to be appropriated to the
23	National Institute of Standards and Technology for car-
24	rying out this Act—
25	(1) \$62,000,000 for fiscal year 2004;

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



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(3) \$75,000,000 for fiscal year 2006. 1 2 ENVIRONMENTAL PROTECTION AGENCY.—There (e)3 are authorized to be appropriated to the Environmental 4 Protection Agency for carrying out this Act— 5 (1) \$5,000,000 for fiscal year 2004; 6 (2) \$5,500,000 for fiscal year 2005; and 7 (3) \$6,000,000 for fiscal year 2006. 8 SEC. **EXTERNAL** REVIEW **OF** 8. THE NATIONAL 9 NANOTECHNOLOGY RESEARCH AND DEVEL-10 **OPMENT PROGRAM.** 11 (a) IN GENERAL.—Not later than 6 months after the 12 date of enactment of this Act, the Director shall enter into an agreement with the National Academy of Sciences to 13 conduct periodic reviews of the Program. The reviews shall 14 15 be conducted once every 3 years during the 10-year period 16 following the enactment of this Act. The reviews shall include— 17 18 (1) an evaluation of the technical achievements 19 of the Program; 20 (2) recommendations for changes in the Pro-21 gram; 22 (3) an evaluation of the relative position of the

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



1	(4) an evaluation of the Program's success in
2	transferring technology to the private sector;
3	(5) an evaluation of whether the Program has
4	been successful in fostering interdisciplinary research
5	and development; and
6	(6) an evaluation of the extent to which the Pro-
7	gram has adequately considered societal and ethical
8	concerns.
9	(b) Study on Molecular Manufacturing.—Not
10	later than 3 years after the date of enactment of this Act
11	a review shall be conducted in accordance with subsection
12	(a) that includes a study to determine the technical feasi-
13	bility of the manufacture of materials and devices at the
14	molecular scale. The study shall—
15	(1) examine the current state of the technology
16	for enabling molecular manufacturing;
17	(2) determine the key scientific and technical
18	barriers to achieving molecular manufacturing;
19	(3) review current and planned research activi-
20	ties that are relevant to advancing the prospects for
21	molecular manufacturing; and
22	(4) develop, insofar as possible, a consensus on
23	whether molecular manufacturing is technically fea-
24	sible, and if found to be feasible—



1	(A) the estimated timeframe in which mo-
2	lecular manufacturing may be possible on a com-
3	mercial scale; and
4	(B) recommendations for a research agenda
5	necessary to achieve this result.
6	(c) Study on Safe Nanotechnology.—Not later
7	than 6 years after the date of enactment of this Act a review
8	shall be conducted in accordance with subsection (a) that
9	includes a study to assess the need for standards, guidelines,
10	or strategies for ensuring the development of safe
11	nanotechnology, including those applicable to—
12	(1) self-replicating nanoscale machines or de-
13	vices;
14	(2) the release of such machines or devices in
15	natural environments;
16	(3) distribution of molecular manufacturing de-
17	velopment;
18	(4) encryption;
19	(5) the development of defensive technologies;
20	(6) the use of nanotechnology as human brain
21	extenders; and
22	(7) the use of nanotechnology in developing arti-
23	ficial intelligence.



1 SEC. 9. SCIENCE AND TECHNOLOGY GRADUATE SCHOLAR-

#### 2 SHIP PROGRAMS.

3 (a) ESTABLISHMENT OF PROGRAMS.—

4 (1) IN GENERAL.—The agency heads shall each
5 establish within their respective departments and
6 agencies a Science and Technology Graduate Scholar7 ship Program to award scholarships to individuals
8 that is designed to recruit and prepare students for
9 careers in the Federal Government that require engi10 neering, scientific, and technical training.

11 (2) Competitive process.—Individuals shall 12 be selected to receive scholarships under this section 13 through a competitive process primarily on the basis 14 of academic merit, with consideration given to finan-15 cial need and the goal of promoting the participation 16 of individuals identified in section 33 or 34 of the 17 Science and Engineering Equal Opportunities Act 18 (42 U.S.C. 1885a or 1885b).

19 (3) SERVICE AGREEMENTS.—To carry out the
20 Programs the agency heads shall enter into contrac21 tual agreements with individuals selected under para22 graph (2) under which the individuals agree to serve
23 as full-time employees of the Federal Government, for
24 the period described in subsection (f)(1), in positions
25 needed by the Federal Government and for which the



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1	individuals are qualified, in exchange for receiving a
2	scholarship.
3	(b) Scholarship Eligibility.—In order to be eligi-
4	ble to participate in a Program, an individual must—
5	(1) be enrolled or accepted for enrollment as a
6	full-time student at an institution of higher education
7	in an academic field or discipline described in a list
8	made available under subsection (d);
9	(2) be a United States citizen or permanent resi-
10	dent; and
11	(3) at the time of the initial scholarship award,
12	not be a Federal employee as defined in section 2105
13	of title 5 of the United States Code.
14	(c) APPLICATION REQUIRED.—An individual seeking
15	a scholarship under this section shall submit an application
16	to an agency head at such time, in such manner, and con-
17	taining such information, agreements, or assurances as the
18	agency head may require.
19	(d) ELIGIBLE ACADEMIC PROGRAMS.—The agency
20	heads shall each make publicly available a list of academic
21	programs and fields of study for which scholarships under

22 their department's or agency's Program may be utilized,23 and shall update the list as necessary.

24 (e) Scholarship Requirement.—



1 (1) IN GENERAL.—Agency heads may provide 2 scholarships under their department's or agency's 3 Program for an academic year if the individual ap-4 plying for the scholarship has submitted to the agency 5 head, as part of the application required under sub-6 section (c), a proposed academic program leading to a degree in a program or field of study on a list made 7 8 available under subsection (d). 9 (2) DURATION OF ELIGIBILITY.—An individual 10 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.

18 (4) AUTHORIZED USES.—A scholarship provided
19 under this section may be expended for tuition, fees,
20 and other authorized expenses as established by the
21 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



May 5, 2003 F:\V8\050503\050503.007

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scholarship under this section for tuition, fees, and
 other authorized expenses are paid directly to the in stitution with respect to which the scholarship is pro vided.

5 (f) PERIOD OF OBLIGATED SERVICE.—

6 (1) DURATION OF SERVICE.—The period of serv-7 ice for which an individual shall be obligated to serve 8 as an employee of the Federal Government is, except 9 as provided in subsection (h)(2), 24 months for each 10 academic year for which a scholarship under this sec-11 tion is provided.

12 (2) SCHEDULE FOR SERVICE.—(A) Except as
13 provided in subparagraph (B), obligated service
14 under paragraph (1) shall begin not later than 60
15 days after the individual obtains the educational de16 gree for which the scholarship was provided.

17 (B) An agency head may defer the obligation of 18 an individual to provide a period of service under 19 paragraph (1) if the agency head determines that 20 such a deferral is appropriate. The agency head shall 21 prescribe the terms and conditions under which a 22 service obligation may be deferred through regulation. 23 Penalties for Breach of Scholarship (q)24 AGREEMENT.—



1 (1) FAILURE TO COMPLETE ACADEMIC TRAIN-2 ING.—Scholarship recipients who fail to maintain a 3 high level of academic standing, as defined by the ap-4 propriate agency head by regulation, who are dis-5 missed from their educational institutions for dis-6 ciplinary reasons, or who voluntarily terminate aca-7 demic training before graduation from the edu-8 cational program for which the scholarship was 9 awarded, shall be in breach of their contractual agree-10 ment and, in lieu of any service obligation arising 11 under such agreement, shall be liable to the United 12 States for repayment within 1 year after the date of 13 default of all scholarship funds paid to them and to 14 the institution of higher education on their behalf 15 under the agreement, except as provided in subsection 16 (h)(2). The repayment period may be extended by the 17 agency head when determined to be necessary, as es-18 tablished by regulation.

19 (2) FAILURE TO BEGIN OR COMPLETE THE SERV20 ICE OBLIGATION OR MEET THE TERMS AND CONDI21 TIONS OF DEFERMENT.—Scholarship recipients who,
22 for any reason, fail to begin or complete their service
23 obligation after completion of academic training, or
24 fail to comply with the terms and conditions of
25 deferment established by the appropriate agency head



1	pursuant to subsection $(f)(2)(B)$ , shall be in breach of
2	their contractual agreement. When recipients breach
3	their agreements for the reasons stated in the pre-
4	ceding sentence, the recipient shall be liable to the
5	United States for an amount equal to—
6	(A) the total amount of scholarships re-
7	ceived by such individual under this section;
8	plus
9	(B) the interest on the amounts of such
10	awards which would be payable if at the time
11	the awards were received they were loans bearing
12	interest at the maximum legal prevailing rate,
13	as determined by the Treasurer of the United
14	States,
15	multiplied by 3.
16	(h) WAIVER OR SUSPENSION OF OBLIGATION.—
17	(1) Death of individual.—Any obligation of
18	an individual incurred under a Program (or a con-
19	tractual agreement thereunder) for service or payment
20	shall be canceled upon the death of the individual.
21	(2) Impossibility or extreme hardship.—
22	The agency heads shall by regulation provide for the
23	partial or total waiver or suspension of any obliga-
24	tion of service or payment incurred by an individual
25	under their department's or agency's Program (or a



contractual agreement thereunder) whenever compli ance 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 Govern ment.

7 (i) DEFINITIONS.—In this section the following defini-8 tions apply:

9 (1) AGENCY HEAD.—The term "agency head" 10 means the Director of the National Science Founda-11 tion, the Secretary of Energy, the Administrator of 12 the National Aeronautics and Space Administration, 13 the Director of the National Institute of Standards 14 and Technology, or the Administrator of the Environ-15 mental Protection Agency.

16 (2) COST OF ATTENDANCE.—The term "cost of
17 attendance" has the meaning given that term in sec18 tion 472 of the Higher Education Act of 1965 (20
19 U.S.C. 1087ll).

20 (3) INSTITUTION OF HIGHER EDUCATION.—The
21 term "institution of higher education" has the mean22 ing given that term in section 101(a) of the Higher
23 Education Act of 1965 (20 U.S.C. 1001(a)).



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

