I am pleased to report that total funding for the Corps of Engineers is nearly $4.6 billion—a total that is $375 million above an utterly insufficient request from the Administration. I wish we were able to do more, but, I feel we were able to keep many very important projects moving forward this year and have been able to begin some new ones.

Total funding for the Bureau of Reclamation is set at $986 million, a total that is $64 million above the President’s request and $15 million above the current year. As a Western Senator I had hoped this would be the year that we got the Bureau up to $1 billion, but we came up just short. However, I am very pleased with the added $20 million from the Bureau’s budget in the right direction.

The conferences were able to provide total funding of $22 billion for the Department of Energy. The Senate was able to convince the House to restore most of the nearly $300 million in cuts to DOE programs, but we are still nearly $120 million below the President’s request. We are, however, $1.2 billion above the current year. The overall increase has allowed the conferences to provide solid funding for the Office of Science, renewable energy projects, and the very important environmental management clean-up projects nationwide.

As most of you know, Senator Domenici is a fierce defender of two nuclear weapons labs in his home State, two institutions that do world class research and have helped to keep our Nation safe and secure for over 50 years. The House cut the requested $2.5 billion for the President’s budget request for Los Alamos and Sandia, a move that would have had very negative ramifications for our Nation’s science-based stockpile stewardship program. I am pleased to report that we were able to return the vast majority of these ill-advised cuts. The people of New Mexico are very lucky to have a Senator as skilled and determined as Pete Domenici working for them.

Frankly, given the battle we were in with the House this year over our bill, I am glad he was also fighting for me and all the other 98 Members of the Senate.

I am very grateful to Chairman Domenici and his new clerk, Tammy Perrin, for being so dogged in their defense of the Senate position on so many issues. I have worked with his previous clerks, Alex Flint and Clay Sell, and they found them both to be outstanding. In Tammy, he has found another terrific clerk.

As always, thanks to Drew Willison, Roger Cockrell, and Nancy Olkewicz of my subcommittee staff. I appreciate everything they do for me and all of the Members of the Senate.

Mr. Frist. Mr. President, I ask unanimous consent that the conference report be adopted and that the motion to reconsider be laid upon the table. The PRESIDING OFFICER. Without objection, it is so ordered. The conference report was agreed to.

MEASURE PLACED ON THE CALENDAR—S. 1875

Mr. Frist. Mr. President, I understand there is a bill at the desk due its second reading. The PRESIDING OFFICER. The clerk will report the title of the bill for the second time.

The legislative clerk read as follows:

A bill (S. 1875) to amend the Employee Retirement Income Security Act of 1974, the Public Health Service Act, and the Internal Revenue Code of 1986 to extend the mental health benefits parity provisions for an additional year. The PRESIDING OFFICER. Without objection, it is so ordered.

MEASURES INDEFINITELY POSTPONED—S. 1415, S. 1671, AND S. 1746

Mr. Frist. Mr. President, I ask unanimous consent that the following measures be indefinitely postponed: Calendar No. 326, S. 1415; Calendar No. 327, S. 1671; Calendar No. 328, S. 1746. The PRESIDING OFFICER. Without objection, it is so ordered.

DEATHS OF ITALIAN CITIZENS IN IRAQ

Mr. Frist. Mr. President, I ask unanimous consent that the Senate now proceed to the consideration of S. Res. 268 introduced earlier today by Senator Graham.

The PRESIDING OFFICER. The PRESIDING OFFICER. The clerk will report the resolution by title.

The legislative clerk read as follows:

A resolution (S. Res. 268) to express the sense of the Senate regarding the deaths of 19 citizens of Italy in Iraq.

There being no objection, the Senate proceeded to consider the resolution. Mr. Frist. Mr. President, I ask unanimous consent that the resolution be agreed to, the preamble be agreed to, the motion to reconsider be laid upon the table, and any statements relating to the resolution be printed in the Record. The PRESIDING OFFICER. Without objection, it is so ordered.

The resolution (S. Res. 268) was agreed to.

The preamble was agreed to.

The resolution, with its preamble, reads as follows:

S. Res. 268

Whereas the people of Italy are long-time friends of the United States; Whereas the people of Italy sent 2,700 of their finest citizens in contribution to the international effort to stabilize Iraq; and Whereas on Wednesday November 12, 2003, 19 Italians including 12 Carabinieri, 5 army soldiers, and 2 civilians were brutally murdered through cowardly acts of terrorism while on duty in Nassiriya, Iraq: Now, therefore, be it

Resolved, That the Senate—

(1) mourns with the people of Italy on their National Day of Mourning for these 19 brave souls; (2) acknowledges the sacrifices of the Italian people; and (3) recognizes the significant contributions that Italy continues to make towards stability and democracy around the world.

21ST CENTURY NANOTECHNOLOGY RESEARCH AND DEVELOPMENT ACT

Mr. Frist. Mr. President, I ask unanimous consent that the Senate proceed to the immediate consideration of calendar No. 280, S. 189. The PRESIDING OFFICER. The PRESIDING OFFICER. The clerk will state the bill by title.

The legislative clerk read as follows:

A bill (S. 189) to authorize appropriations for nanoscale, nanoengineering, and nanotechnology research, and for other purposes.

There being no objection, the Senate proceeded to consider the bill, which had been reported from the Committee on Commerce, Science, and Transportation, with an amendment to strike all after the enacting clause and inserting in lieu thereof the following: [Strike the part shown in black brackets and insert the part shown in italic.]

S. 189

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 “21st Century Nanotechnology Research and Development Act”.

SEC. 2. FINDINGS.

The Congress makes the following findings:

(1) The emerging fields of nanoscale and nanotechnology (collectively, “nanotechnology”), in which matter is manipulated at the atomic level (i.e., atom-by-atom or molecule-by-molecule) in order to build materials, machines, and devices with novel properties or functions, are leading to unprecedented scientific and technological opportunities that will benefit society by changing the way many things are designed and made.

(2) Long-term nanoscale research and development leading to potential breakthroughs in areas such as materials and manufacturing, electronics, medicine and healthcare, energy, environment, chemicals, biotechnology, agriculture, information technology, and national security could be significant as the combined influences of microelectronics, biotechnology, and information technology on the 21st century. Nanotechnology could lead to things such as:

(A) new generations of electronics where...

(B) manufacturing that requires less material, pollutes less, and is embedded with sophisticated sensors that will internally respond by releasing chemicals that will prevent damage;
(C) prosthetic and medical implants whose surfaces are molecularly designed to interact with the cells of the body; 

(D) materials with unprecedented com-bination of strength, toughness, light-weight that will enable land, sea, air, and space vehicles to become lighter and more fuel efficient; 

(E) selective membranes that can fish out specific toxic or valuable particles from industrial waste or that can inexpensively desalinate sea water; and 

(F) robots or spacecraft that will cost less, consume very little power, adapt to unexpected environments, change its capabilities as needed, and be completely autonomous. 

(3) Long-term, high-risk research is necessary to create breakthroughs in technology. Such research requires government funding since the benefits are too distant or uncertain for industry alone to support. Current federal investments in nanotechnology research and development are not grounded in any specifically authorized statutory foundation. As a result, there is a risk that future funding for long-term, innovative research projects such as high-risk technological development will not be secured.

(4) The federal government can play an important role in the development of nanotechnology, as this science is still in its infancy, and it will take many years of sustained investment for this field to achieve maturity.

(5) Many foreign countries, companies and scientists believe that nanotechnology will be the leading technology of the 21st century and are investing heavily into its research. According to a study of international nanotechnology research efforts sponsored by the National Science and Technology Council, the United States is at risk of falling behind its international competitors, including Japan, South Korea, and Europe if it fails to sustain broad-based funding in nanotechnology. The United States cannot afford to fall behind our competitors if we want to maintain our economic strength.

(6) Advances in nanotechnology stemming from federal investments in fundamental research and subsequent private sector development of practical technologies that support the work and improve the efficiency of the federal government, and contribute significantly to the efforts of the government.

(7) According to various estimates, including those of the National Science Foundation, the market for nanotech products and services in the United States alone could reach over $1 trillion later this century.

(8) Nanotechnology will evolve from modern advances in chemical, physical, biological, electrical, and materials research, and will contribute to cross-disciplinary training of the 21st century science and technology workforce.

(9) Mastering nanotechnology will require a unique skill set for scientists and engineers that combine chemistry, physics, materials science, and biology. For example, in these critical areas has been flat for many years and as a result fewer young people are electing to go into these areas in graduate schools throughout the United States. This will have to reverse if we hope to develop the next generation of skilled workers with multidisciplinary perspectives necessary for the development of nanotechnology.

(10) Research on nanotechnology creates unprecedented capabilities to alter ourselves and our environment and will give rise to a host of ethical, philosophical, legal and societal issues. To appropriately address these issues will require wide reflection and guidance that are responsive to the realities of the science, as well as additional research to predict, understand, and alleviate anticipated problems.

(11) Nanotechnology will provide structures to enable the revolutionary concept of quantum computing, which uses quantum mechanical properties to do calculation. Quantum computing permits a small number of atoms to potentially store and process enormous amounts of information. Just 300 interacting atoms in a quantum computer could store as much information as a classical electronic computer that uses all the particles in the universe, and today's complex engines which would take today's best super computer 20 billion years, could be cracked in 30 minutes.

(12) The Executive Branch has previously established the National Nanotechnology Initiative to coordinate Federal nanotechnology research and development programs. This initiative has contributed significantly to the development of nanotechnology. Authorizing legislation can serve to establish new technology goals and research directions, improve agency coordination and oversight, and help ensure optimal returns to investment, and simplify reporting, budgeting, and planning processes for the Executive Branch and the Congress.

(13) The private sector technology innovations that grow from fundamental nanotechnology research partnerships, and are critical to our high-tech industries, have the haphazard, expensive, and generally inefficient technology transition path. Strategies for accelerating the transition of fundamental knowledge and innovations in commercial products or to support mission agencies should be explored, developed, and when appropriate, executed.

(14) Existing data on the societal, ethical, educational, legal, and workforce implications and issues related to nanotechnology are lacking. To help decision-makers and affected parties better anticipate issues likely to arise with the onset and maturation of nanotechnology, research and studies on these issues must be conducted and disseminated.

(15) Many States and regions have begun nanotechnology programs. These programs have developed expertise, particularly with regard to nanoscience and engineering research in nanotechnology. The Federal nanotechnology program should leverage these existing State and local initiatives, and comprehensive nanotechnology research portfolio.

(16) In “Small Wonders, Endless Frontiers” the National Academy of Sciences’ National Research Council recommends increased investment in nanotechnology, particularly in the areas of nanoscience and nanotechnology. Such investments will allow significant advancements in biotechnology and medicine.

(17) It is the purpose of this Act to authorize a coordinated inter-agency program that will support long-term nanoscale research and development leading to potential breakthroughs in areas such as materials and manufacturing, nanoelectronics, medicine and healthcare, environment, energy, chemical and pharmaceutical industries, biotechnology and agriculture, computation and information technology, and national and homeland security.

(SEC. 4. NATIONAL NANOTECHNOLOGY RESEARCH PROGRAM.

(a) NATIONAL NANOTECHNOLOGY RESEARCH PROGRAM.—The President shall establish a National Nanotechnology Research Program. The program shall be administered by the National Nanotechnology Coordination Office, the program shall—

(1) establish the goals, priorities, grand challenges, and metrics for evaluation for Federal nanotechnology research, development, and other activities; 

(2) coordinate Federal research and development programs in nanotechnology and related sciences to achieve those goals; and 

(3) provide for interagency coordination of Federal nanotechnology research, development, and other activities undertaken pursuant to the program.

(b) GOALS OF THE NATIONAL NANOTECHNOLOGY RESEARCH PROGRAM.—The goals of the program are as follows:

(1) The coordination of long-term fundamental nanoscale science and engineering research to build a fundamental understanding of matter enabling control and manipulation at the nanoscale; 

(2) The assurance of continued United States global leadership in nanotechnology to meet national goals and to support national economic, health, national security, educational, and scientific interests.

(3) The advancement of United States productivity and industrial competitiveness through stable, consistent, and coordinated investments in long-term, fundamental science and engineering research in nanotechnology.

(4) The development of a network of state and academic facilities, research centers, including State supported centers, that will play a critical role in accomplishing the other goals of the program, fosters industrial growth, and utilizes next generation scientific tools.

(5) The development of enabling infrastructural technologies that United States industry can use to commercialize new discoveries and innovations in nanoscience.

(6) The acceleration of the deployment and adoption of advanced nanotechnology and concepts into the private sector.

(7) The establishment of a program designed to provide effective education and training for the next generation of researchers and professionals skilled in the multidisciplinary perspectives necessary for nanotechnology.

(8) To ensure that philosophical, ethical, and other societal concerns will be considered alongside the development of nanotechnology.

(c) RESEARCH AND DEVELOPMENT AREAS.—Through its participating agencies, the National Nanotechnology Research Program shall develop, fund, and manage Federal research programs in the following areas:

(1) LONG-TERM FUNDAMENTAL RESEARCH.—The program shall undertake long-term basic nanoscience and engineering research that focuses on fundamental understanding and synthesis of nanometer-size building blocks with potential for breakthroughs in areas such as materials and manufacturing, nanoelectronics, medicine and healthcare, environment, energy, chemical and pharmaceutical industries, biotechnology and agriculture, computation and information technology, and national security. Funds made available from the appropriate agencies under this paragraph shall be used—

(A) to provide awards of less than $1,000,000 each to single investigators and small groups to provide sustained support to individuals conducting research, develop small long-term laboratories, or conduct fundamental, innovative research; and

(B) to fund fundamental research and the development of university-industry-laboratory and interagency (including State-led) partnerships.

(2) GRAND CHALLENGES.—The program shall address grand challenges that are essential for the advancement of the field and interdisciplinary research and education
teams, including multidisciplinary nanotechnology research centers, that work on major long-term objectives. This funding area will fund, through participating agencies, interdisciplinary research and education teams that aim to achieve major, long-term objectives, such as the following: 

- Nanomaterials by design which are stronger, lighter, harder, self-repairing, and safer.
- Nanoelectronics, optoelectronics, and magnetism.
- Healthcare applications.
- Nanoscale processes and environment.
- Energy and energy conservation.
- Interdisciplinary research and education teams that aim to achieve major, long-term objectives, such as the following: 

- Nanomaterials by design which are stronger, lighter, harder, self-repairing, and safer.
- Nanoelectronics, optoelectronics, and magnetism.
- Healthcare applications.
- Nanoscale processes and environment.
- Energy and energy conservation.

The Center shall also conduct studies and workforce issues related to nanotechnology.

-NANOTECHNOLOGY.

LEGAL, AND WORKFORCE ISSUES RELATED TO NANOTECHNOLOGY.

ø (5) S OCIETAL, ETHICAL, EDUCATIONAL, LEGAL, AND WORKFORCE ISSUES RELATED TO NANOTECHNOLOGY.—The Director of the National Science Foundation shall establish a new Center for Societal, Ethical, Educational, Legal, and Workforce Issues related to Nanotechnology. The Center shall conduct studies and provide input and assistance to the Director of the National Science Foundation in completing the annual report required under paragraph (b)(2) of this Act.

ø (6) T RANSITION OF TECHNOLOGY.—The program, through its participating agencies, shall ensure cooperation and collaboration with industry in all relevant research efforts and develop mechanisms to assure prompt technology transition.

ø (7) G AP FUNDING.—The program shall address gaps identified by the National Science Foundation under section 5(a)(9) of this Act through a program of competitive grants to be awarded in such areas by the Director of the National Science Foundation using the Foundation's funds and any funds contributed to the Foundation by other participating agencies for the purposes of carrying out the program, to government or non-government awardees. Where appropriate, such grants may encourage interagency partnerships or leverage the expertise of State-supported nanotechnology programs.

SEC. 5. PROGRAM COORDINATION AND MANAGEMENT.

(a) IN GENERAL.—The National Science and Technology Council shall oversee the planning, management, and coordination of the Foundation's research and development program. The Council, itself or through an appropriate subgroup it designates or establishes, shall:

- (1) establish broad applications of nanotechnology research and development, or grand challenges, to be met by the results and activities of the program, based on national needs;
- (2) submit to the Congress through the Senate Committee on Commerce, Science, and Transportation, and the House of Representatives, the Basis Science, an annual report, along with the President's annual budget request, describing the implementation of this Act's policies in section 4;
- (3) provide for interagency coordination of the program, including with the Department of Defense;
- (4) coordinate the budget requests of each of the agencies involved in the program with the Office of Management and Budget to ensure that a balanced research portfolio is maintained in order to ensure the appropriate level of research effort;
- (5) provide guidance each year to the participating departments and agencies concerning procurement requests for activities related to the program;
- (6) consult with academic, industry, State and local government (including State and regional nanotechnology programs), and other appropriate groups conducting research on and using nanotechnology;
- (7) establish an Information Services and Applications Council to promote access to and early application of the technologies, innovations, and expertise derived from nanotechnology research and development programs; and systems across the Federal government, and to United States industry.

(b) SELECTION PROCEDURES.—The President shall establish a National Nanotechnology Advisory Panel, required pursuant to subsection (b)(4), shall include:

- (1) a review of the program's technical support in achieving the stated goals and grand challenges according to the metrics established by the program and Advisory Panel;
- (2) a review of the program's management and coordination;
- (3) a review of the funding levels by each agency for the program's activities and their ability to achieve the program's stated goals and grand challenges;
- (4) a review of the balance in the program's portfolio and components across agencies and disciplines;
- (5) an assessment of the degree of participation in the program by minority serving institutions and institutions located in States participating in NSF's EPSCoR program;
- (6) a review of policy issues resulting from advancements in nanotechnology and its effects on the scientific enterprise, commerce, workforce, competitiveness, national security, medicine, and government operations;
- (7) recommendations for new research areas, partnerships, coordination and management; and programs to be established to achieve the program's stated goals and grand challenges;
[(I) recommendations for new investments by each participating agency in each program funding area for the 5-year period following the delivery of the report;]
[(J) recommendations regarding other issues deemed pertinent or specified by the panel; and]
[(K) a technology transition study which includes an evaluation of the Federal nanotechnology research and development program’s success in transitioning its research, technologies, and concepts into commercial products, including:
[(i) examples of successful transition of research, technologies, and concepts from the Federal nanotechnology research and development program into commercial and military products;]
[(ii) best practices of universities, government, and industry in promoting efficient and rapid technology transition in the nanotechnology sector;]
[(iii) barriers to efficient technology transition in the nanotechnology sector, including, but not limited to, standards, pace of technological change, qualification and testing of research products, intellectual property issues, and Federal funding; and]
[(iv) recommendations for government sponsored activities to promote rapid technology transition in the nanotechnology sector;]
[(2) Office of Management and Budget Review—]
[(A) Budget Request Review—Each Federal agency and department participating in the program shall, as part of its annual request for appropriations, submit information to the Office of Management and Budget including:
[(i) each element of its nanotechnology research and development activities that contribute directly to the program or benefit from the program;]
[(ii) the portion of its request for appropriations that is allocated to each such element; and]
[(iii) the portion of its request for appropriations that is allocated to each program funding area;]
[(B) OMB Review and Allocation Statement—The Office of Management and Budget shall review the information provided under subparagraph (A) in light of the goals, priorities, grand challenges, and agency and departmental responsibilities set forth in the annual report of the Council under paragraph (2); include in the Federal budget for the next fiscal year an annual budget estimate, a statement delineating the amount and portion of each appropriate agency’s or department’s annual budget that is allocated to its activities undertaken pursuant to the program;]
[(3) Annual NSTC Report to Congress on the Nanotechnology Research Development Program—The National Science and Technology Council shall submit an annual report to the Congress that—
[(A) includes a detailed description of the goals, priorities, grand challenges, and agency and departmental responsibilities set forth in the annual report of the Council under paragraph (2);]
[(B) sets forth the relevant programs and activities for the fiscal year with respect to which the budget submission applies, of each Federal agency and department, participating in the program, as well as such other agencies and departments as the President or the Director considers appropriate;]
[(C) describes the levels of Federal funding for the fiscal year during which such report is submitted and the level of Federal funding for the current fiscal year with respect to which the budget submission applies, for each of the program funding areas of the program;]
[(D) describes the levels of Federal funding for each agency and department participating in the program and each program funding area for the fiscal year during which such report is submitted, and the levels proposed for the fiscal year with respect to which the budget submission applies, and such other reports as the President or the Director considers appropriate;]
[(E) describes coordination and partnership activities with States, local, international, and private sector efforts in nanotechnology research and development, and how they support the goals of the program;]
[(F) describes mechanisms and efforts used by the program to assist in the transition of innovative and high-priority Federal nanotechnology research, technologies, and concepts to commercial enterprises, and successes in these transition activities;]
[(G) describes coordination between the military and civilian portions, as well as the life science and non-life science portions, of the program in technology development, supporting the goals of the program, and supporting the mission needs of the departments and agencies involved;]
[(H) analyzes the progress made toward achieving the goals, priorities, and grand challenges designated for the program according to the metrics established by the program and the Advisory Panel; and]
[(I) recommendations of mechanisms of coordination, program funding areas, partnerships, or activities necessary to achieve the goals, priorities, and grand challenges established for the program;]
[(J) a triennial external review of nanotechnology research and development program—]
[(A) in general—The Director of the National Science Foundation shall enter into an arrangement with the National Research Council of the National Academy of Sciences to conduct a triennial evaluation of the Federal nanotechnology research and development program, including—
[(i) a review of the technical success of the program in achieving the stated goals and grand challenges under the metrics established by the program and the nanotechnology Advisory Panel, and under other appropriate measurements;]
[(ii) a review of the program’s management and coordination across agencies and disciplines;]
[(iii) a review of the funding levels by each agency for the program’s activities and their alignment with the stated goals and grand challenges of the program’s stated goals and grand challenges;]
[(iv) recommendations for new or revised program goals and grand challenges;]
[(v) recommendations for new research areas, partnerships, coordination and management mechanisms, or programs to be established to achieve the program’s stated goals and grand challenges; and]
[(vi) recommendations for investment levels in light of goals by each participating agency in each program funding area for the 5-year period following the delivery of the report;]
[(J) recommendations on policy, program, and budget changes with respect to nanotechnology research and development activities;]
[(K) recommendations for improved metrics to evaluate the success of the program in accomplishing its stated goals and grand challenges;]
[(L) a review of the performance of the Information Services and Applications Council and its efforts to promote access to and early adoption of the technologies, innovations, and expertise derived from program activities to agency missions and systems across the Federal government and to United States industry and international partners;]
[(M) an analysis of the relative position of the United States compared to other nations with respect to nanotechnology research and development, including the identification of any critical research areas where the United States should be the world leader to best achieve the goals of the program;]
[(N) evaluation to be transmitted to congress—The Director of the National Science Foundation shall transmit the results of any evaluation for which it made arrangements under subparagraph (A) to the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committees on Appropriations upon receipt. The first such evaluation shall be transmitted no later than January 10, 2005, with subsequent evaluations transmitted to the Committees every 5 years thereafter.]
[SEC. 6. Authorization of Appropriations—]
[(A) National Science Foundation—]
[(1) General Authorization—There are authorized to be appropriated to the Director of the National Science Foundation to carry out the Director’s responsibilities under this Act $396,150,000 for fiscal year 2004.
[(2) Specific Appropriations—]
[(A) Interdisciplinary Nanotechnology Research Centers—Of the amounts described in paragraph (1), $50,000,000 for fiscal year 2004, shall be available for grants of up to $5,000,000 each for interdisciplinary nanotechnology research centers;
[(B) Center for Societal, Ethical, Educational, Legal, and Economic Issues Related to Nanotechnology—Of the sums authorized for the National Science Foundation each fiscal year, $5,000,000 shall be used to establish a university-based Center for Societal, Ethical, Educational, Legal, and Workforce Issues Related to Nanotechnology;
[(C) National Nanotechnology Coordination Office—Of the sums authorized for the National Science Foundation each fiscal year, $5,000,000 shall be used for the activities of the Nanotechnology Coordination Office;
[(D) Gap Funding—Of the sums authorized for the National Science Foundation each fiscal year, $5,000,000 shall be available for use in the competitive grants as described in section 4(c)(7) of this Act.
[(E) Department of Energy—There are authorized to be appropriated to the Secretary of Energy to carry out the Secretary’s responsibilities under this Act $160,195,000 for fiscal year 2004.
[(F) National Aeronautics and Space Administration—There are authorized to be appropriated to the Administrator of the National Aeronautics and Space Administration to carry out the Administrator’s responsibilities under this Act $265,121,000 for fiscal year 2004.
[(G) National Institutes of Health—There are authorized to be appropriated to the Director of the National Institutes to carry out the Director’s responsibilities under this Act $49,680,000 for fiscal year 2004.
[(H) National Institutes of Standards and Technology—There are authorized to be appropriated to the Director of the National Institute of Standards and Technology to carry out the Director’s responsibilities under this Act $50,600,000 for fiscal year 2004.
[(I) Environmental Protection Agency—There are authorized to be appropriated to the Administrator of the Environmental Protection Agency to carry out the Administrator’s responsibilities under this Act $5,750,000 for fiscal year 2004.
[(J) Department of Justice—There are authorized to be appropriated to the Director of the National Institute of Justice to carry out the Director’s responsibilities under this Act $34,000,000 for fiscal year 2004.
[(K) Office of Management and Budget Review—There are authorized to be appropriated to the Director of the National Science Foundation to carry out the Director’s responsibilities under this Act $396,150,000 for fiscal year 2004.
[SEC. 7. Authorities and Functions of Committees—]
the Secretary of Transportation to carry out the Secretary’s responsibilities under this Act $2,300,000 for fiscal year 2004. (i) DEPARTMENT OF AGRICULTURE.—There are authorized to be appropriated to the Secretary of Agriculture to carry out the Secretary’s responsibilities under this Act $2,870,000 for fiscal year 2004.

SEC. 7. NON-FUNDING, EDUCATIONAL, LEGAL, AND WORKFORCE ISSUES RELATED TO NANOTECHNOLOGY.

(a) Studies.—The Director of the National Science Foundation shall encourage, conduct, coordinate, commission, collect, and disseminate studies on the societal, ethical, educational, and workforce implications of the National Nanotechnology Coordination Office established under subsection (c) of this Act. (b) Annual Report.—The Director of the National Science Foundation shall compile the studies required by paragraph (2) and, with the assistance of the Center for Social, Ethical, Educational, Legal, and Workforce Issues Related to Nanotechnology established under section 4(c)(5) of this Act, shall complete a report that includes a description of the Center’s activities, which shall be submitted to the President, the Council, the Senate Committee on Commerce, Science, and Transportation, and the House and Representatives Committee on Science not later than 18 months after the date of enactment of this Act.

SEC. 8. DEFINITIONS.

In this Act:

(1) ADVISORY PANEL.—The term “Advisory Panel” means the President’s National Nanotechnology Panel.

(2) FUNDAMENTAL RESEARCH.—The term “fundamental research” means research that builds a fundamental understanding and leads to discoveries of the phenomena, processes, and tools necessary to control and manipulate the nanoscale.

(3) GRAND CHALLENGE.—The term “grand challenge” means a fundamental problem in science or engineering, with broad economic and societal impact, whose solution will require the application of nanotechnology.

(4) INTERDISCIPLINARY NANOTECHNOLOGY RESEARCH CENTER.—The term “interdisciplinary nanotechnology research center” means a group of 6 or more researchers collaborating across scientific and engineering disciplines on large-scale long-term research projects and significantly advancing the science supporting the development of nanotechnology or the use of nanotechnology in addressing scientific issues of national importance, consistent with the goals set forth in section 4(b).

(5) NANOTECHNOLOGY.—The term “nanotechnology” means the ability to work at the molecular level, atom-by-atom, to create large structures with fundamentally new molecular organization.

(6) PROGRAM.—The term “program” means the National Nanotechnology Research Program established under section 4.

(7) RESEARCH INFRASTRUCTURE.—The term “research infrastructure” means the measurement, computation, modeling, and simulation, and user facilities needed to develop a flexible and enabling infrastructure so that United States industry can rapidly commercialize new discoveries in nanotechnology.

SECTION 1. SHORT TITLE.

This Act may be cited as the “21st Century Nanotechnology Research and Development Act”.

SEC. 2. NATIONAL NANOTECHNOLOGY PROGRAM.

(a) NATIONAL NANOTECHNOLOGY PROGRAM.—The President shall establish a National Nanotechnology Program. Through appropriate agencies, councils, and the National Nanotechnology Coordination Office established in subsection (c) of this Act, the President shall—

(1) establish the goals, priorities, grand challenges, and metrics for evaluation for Federal nanotechnology research, development, and other activities;

(2) invest in Federal research and development programs in nanotechnology and related sciences;

(3) provide for interagency coordination of Federal nanotechnology research, development, and other activities undertaken pursuant to the Program;

(4) develop a network of shared facilities and centers to foster partnerships among researchers in nanotechnology;

(5) accelerating the deployment and application in the private sector, including startup companies, of nanoscale-related research and development;

(6) providing effective education and training for researchers and professionals skilled in the multidisciplinary perspectives necessary for nanotechnology so that a true interdisciplinary research culture for nanoscale science, engineering, and technology can emerge;

(7) ensuring that ethical, legal, environmental, and other appropriate societal concerns are considered during the development of new nanotechnologies and sustainable nanoscale products and processing;

(8) program management.—The National Science and Technology Council shall oversee the planning and coordination of the National Nanotechnology Program. The Council, itself or through an appropriate subgroup it designates or establishes, shall—

(1) establish a set of broad applications of nanotechnology research and development, or grand challenges, to be met by the results and activities of the Program, based on national needs;

(2) provide for interagency coordination of the Program, including with the activities of the Defense Department, and the Federal government in general, across Federal agencies and instrumentals, for each program component area, and for all activities pursuant to subsection (b).

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

(1) the Program budget, for the current fiscal year, for each agency that participates in the Program, including all Federal funding for the development and acquisition of research facilities and instrumentation, for each program component area, and for all activities pursuant to subsection (b), shall be submitted by December 31st of such year;

(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 subsection (b);

(3) an analysis of the proposed project budgets for the next fiscal year, for each agency that participates in the Program, including an analysis of the proposed project budgets for the development and acquisition of research facilities and instrumentation, for each program component area, and for all activities pursuant to subsection (b);

(4) an analysis of the extent to which the Program has incorporated the recommendations of the Advisory Panel and the Center, established in subsection (b), and an analysis of the extent to which the Program has incorporated the recommendations of the National Nanotechnology Panel; and

(5) an assessment of how Federal agencies are implementing the plan described in section 4(b).
(c)(7), and a description of the amount of Small Business Innovative Research and Small Business Technology Transfer Research Funds supporting the plan.

SEC. 3. ADVISORY PANEL.

(a) IN GENERAL.—The President shall establish or designate a National Nanotechnology Advisory Panel.

(b) QUALIFICATIONS.—The Panel established or designated by the President under subsection (a) shall consist primarily of individuals who are non-Federal members and shall include representatives of academia and industry. Members of the Panel shall be qualified to provide advice and information on nanotechnology research, development, demonstrations, education, technology transfer, commercial application, or societal and economic concerns. In designating an Advisory Panel, the President may also seek and give consideration to recommendations from the Congress, industry, the scientific community (including the National Academy of Sciences), scientific professional societies, academia, the defense community, State and local governments, regional nanotechnology programs, and other appropriate organizations.

(c) DUTIES.—The Panel shall advise the President and the Council on matters relating to the Program, including assessing—

(1) 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 components and agencies;

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

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

(7) whether societal, ethical, environmental, and workforce concerns are adequately addressed by the Program.

(d) REPORTS.—The Advisory Panel shall report, not less frequently than once every 2 fiscal years, to the President, the Senate Committee on Commerce, Science, and Technology, and the House of Representatives Committee on Science on its assessments under subsection (c) and its recommendations for ways to improve the Program. The first report under this subsection shall be submitted within 1 year after the date of enactment of this Act.

(e) TRAVEL EXPENSES.—Non-Federal members of the Panel, while attending meetings of the Panel or while otherwise serving at the request of the head of the Panel, shall be entitled to travel expenses, including per diem in lieu of subsistence, authorized by section 5703 of title 5, United States Code, for personnel in the Government serving without pay. Nothing in this subsection shall be construed to prohibit members of the Panel who are officers or employees of the United States from receiving travel and per diem expenses, including per diem in lieu of subsistence, in accordance with existing law.

SEC. 4. TRIENNIAL EXTERNAL REVIEW OF NATIONAL NANOTECHNOLOGY RESEARCH AND DEVELOPMENT PROGRAM.

(a) IN GENERAL.—The Director of the National Science Foundation shall enter into an arrangement with the National Academy of Sciences to conduct a triennial evaluation of the National Nanotechnology Program, including—

(1) an evaluation of the technical success of the Program in achieving the stated goals under the metrics established by the Program and the Advisory Panel, and under other appropriate measurement techniques;

(2) a review of the Program’s management and coordination across agencies and disciplines;

(3) a review of the funding levels by each agency for the Program’s activities and their ability with such funding to achieve the Program’s stated goals;

(4) recommendations for new or revised Program goals;

(5) recommendations for new research areas, partnerships, coordination and management mechanisms, or programs to be established to achieve the Program’s stated goals;

(6) recommendations for investment levels by each participating agency in each Program funding area for a fiscal year period following the delivery of the report;

(7) recommendations on policy, program, and budget changes with respect to nanotechnology research and development activities;

(8) recommendations for improved metrics to evaluate the success of the Program in accomplishing its stated goals;

(9) a review of the performance of the National Nanotechnology Coordination Office and its efforts to promote access to and early application of the technologies, innovations, and expertise derived from program activities to agency programs and missions and systems across the Federal Government and to United States industry; and

(10) an analysis of the relative position of the United States and other nations with respect to nanotechnology research and development, including the identification of any critical research areas where the United States should be the world leader to best achieve the goals of the Program.

(b) EVALUATION TO BE TRANSMITTED TO CONGRESS.—The Director of the National Science Foundation shall transmit the results of any evaluation for which it made arrangements under subsection (a) to the Advisory Panel, the Senate Committee on Commerce, Science, and Technology, and the House of Representatives Committee on Science upon receipt. The first such evaluation shall be transmitted no later than June 10, 2005, with subsequent evaluations transmitted to the Committees every 3 years thereafter.

SEC. 5. AUTHORIZATION OF APPROPRIATIONS.

(a) NATIONAL SCIENCE FOUNDATION.—

(1) IN GENERAL.—There are authorized to be appropriated to the Director of the National Science Foundation to carry out the Director’s responsibilities under this Act—

(A) $595,000,000 for fiscal year 2004;

(B) $855,000,000 for fiscal year 2005;

(C) $1,100,000,000 for fiscal year 2006;

(D) $1,375,000,000 for fiscal year 2007;

(E) $1,450,000,000 for fiscal year 2008.

(2) DISCRETIONARY EXPENSES.—There are authorized to be appropriated to the Director, National Science Foundation to carry out the Director’s responsibilities under this Act—

(A) $500,000,000 for fiscal year 2004;

(B) $620,000,000 for fiscal year 2005;

(C) $690,000,000 for fiscal year 2006;

(D) $1,000,000,000 for fiscal year 2007;

(E) $1,200,000,000 for fiscal year 2008.

(b) DEPARTMENT OF COMMERCE.—There are authorized to be appropriated to the Secretary of Commerce to carry out the Secretary’s responsibilities under this Act—

(1) $40,000,000 for fiscal year 2004;

(2) $51,000,000 for fiscal year 2005;

(3) $58,000,000 for fiscal year 2006;

(4) $75,000,000 for fiscal year 2007;

(5) $80,000,000 for fiscal year 2008;

(6) $100,000,000 for fiscal year 2009.

(c) DEPARTMENT OF JUSTICE.—There are authorized to be appropriated to the Director, National Institute of Standards and Technology to carry out the Director’s responsibilities under this Act—

(1) $6,000,000 for fiscal year 2004;

(2) $7,700,000 for fiscal year 2005;

(3) $8,500,000 for fiscal year 2006;

(4) $9,000,000 for fiscal year 2007; and

(5) $9,500,000 for fiscal year 2008.

(d) NATIONAL INSTITUTES OF HEALTH.—There are authorized to be appropriated to the Director of the National Institutes of Health to carry out the Director’s responsibilities under this Act—

(1) $100,000,000 for fiscal year 2004;

(2) $110,000,000 for fiscal year 2005;

(3) $120,000,000 for fiscal year 2006;

(4) $130,000,000 for fiscal year 2007; and

(5) $140,000,000 for fiscal year 2008.

(e) DEPARTMENT OF TRANSPORTATION.—There are authorized to be appropriated to the Secretary of Transportation to carry out the Secretary’s responsibilities under this Act—

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

(2) $6,800,000 for fiscal year 2005;

(3) $7,500,000 for fiscal year 2006;

(4) $8,000,000 for fiscal year 2007; and

(5) $8,500,000 for fiscal year 2008.

(f) ENVIRONMENTAL PROTECTION AGENCY.—There are authorized to be appropriated to the Administrator of the Environmental Protection Agency to carry out the Administrator’s responsibilities under this Act—

(1) $6,400,000 for fiscal year 2004;

(2) $6,400,000 for fiscal year 2005;

(3) $6,400,000 for fiscal year 2006;

(4) $6,400,000 for fiscal year 2007;

(5) $6,800,000 for fiscal year 2008.

(g) DEPARTMENT OF HOMELAND SECURITY.—There are authorized to be appropriated to the Secretary of Homeland Security to carry out the Secretary’s responsibilities under this Act—

(1) $16,000,000 for fiscal year 2004;

(2) $17,500,000 for fiscal year 2005;

(3) $18,000,000 for fiscal year 2006;

(4) $20,000,000 for fiscal year 2007; and

(5) $25,000,000 for fiscal year 2008.

SEC. 6. AMERICAN NANOTECHNOLOGY PREPAREDNESS CENTER.

(a) IN GENERAL.—The Director of the National Science Foundation shall establish and designate a National Nanotechnology Preparedness Center to encourage, conduct, coordinate, commission, collect, and disseminate research on educational, legal, workforce, societal, and ethical issues related to nanotechnology.
Panel nanotechnology research, including commercialization of nanoscience and clearinghouse for information related to commercialization of nanoscience and private sector laboratories transitioning concepts from Federal nanotechnology research initiatives; and the development and manufacture of nanomaterials, or 1/100,000 meters, or 1/100,000 nanometers. 

(b) STUDIES.—The Director of the National Science Foundation, through the Center, shall conduct, coordinate, commission, collect, and disseminate studies on the educational, legal, workforce, and ethical implications of nanotechnology. The studies shall identify anticipated issues and problems, as well as provide recommendations for preventing or addressing such issues and problems.

(c) WORKFORCE DATA.—The Director of the National Science Foundation shall collect data on the size of the anticipated nanotechnology workforce need by detailed occupation, industry, and firm characteristics, and assess the adequacy of the trained talent pool in the United States ensuring workforce needs.

(d) ANNUAL REPORT.—The Director of the National Science Foundation shall compile the studies and data pursuant to paragraphs (b) and (c), and, with the assistance of the Center, shall complete a report that includes a description of the Center’s activities, which shall be submitted to the President, the Appropriations Committees of the Senate and the House of Representatives, and the House of Representatives Committee on Science. At not later than 18 months after the date of enactment of this Act, the President shall submit a report to the Senate and the House of Representatives that includes a description of the Center’s activities and recommendations for preventing or addressing such issues and problems.

(e) STUDIES.—The Director of the National Science Foundation shall, in consultation with the National Nanotechnology Coordination Office, study and report on the size of the anticipated nanotechnology workforce need by detailed occupation, industry, and firm characteristics, and assess the adequacy of the trained talent pool in the United States ensuring workforce needs.

Sect. 7. COMMERCIALIZATION ISSUES RELATED TO NANOSCIENCE AND NANOTECHNOLOGY

(a) IN GENERAL.—The Director of the National Institute of Standards and Technology shall establish a center within NIST’s Manufacturing Extension Partnership Program to conduct, coordinate, commission, collect, and disseminate research and development data and knowledge related to nanoscience and nanotechnology research. The program shall—

2. conduct research on issues related to the development and manufacture of nanotechnology including—

(A) reliability and quality assurance standards and practices;

(B) manufacturing best practices; and

(C) processes and products for nanomaterials.

3. in consultation with the National Technical Information Service and the National Nanotechnology Coordination Office, act as a clearinghouse for information related to commercialization of nanoscience and nanotechnology research, including—

(A) the Center’s activities by regional, state, and local commercial nanotechnology initiatives;

(B) the transition of research, technologies, and concepts from Federal nanotechnology research and development programs into commercial and military products;

(C) the roles of government, university, and private sector laboratories transitioning technology to commercial use;

(D) the roles of workers in overcoming barriers and challenges to technology deployment; and

(E) the development of new nanotechnology manufacturing processes.

(b) USE OF MANUFACTURING EXTENSION PARTNERSHIP PROGRAM.—The Director of the National Institute of Standards and Technology shall utilize the manufacturing extension partnership program to the extent possible to reach small and medium sized manufacturing companies.

(c) MANUFACTURING TECHNOLOGIES FOR NANOMATERIALS.—The Director of the National Science Foundation shall establish, on a merit-reviewed basis, a new Center for Nanomaterials Manufacturing to encourage the development and transfer of technologies for the manufacture of nanomaterials. The Center will encourage, conduct, coordinate, commission, collect, and disseminate research on new nanomaterials manufacturing technologies for materials with unprecedented combinations of strength, toughness, lightweight, ductility, resistance, and memory; and separation characteristics, and develop mechanisms to transfer such manufacturing technologies to United States industries.

Sec. 8. DEFINITIONS

In this Act:

(1) ADVISORY PANEL.—The term “Advisory Panel” means the President’s National Nanotechnology Panel established or designated under section 3.

(2) FUNDAMENTAL RESEARCH.—The term “fundamental research” means research that builds a fundamental understanding and leads to discoveries of the phenomena, processes, and tools necessary to control and manipulate matter at the nanoscale.

(3) NANOTECHNOLOGY.—The term “nanotechnology” means the application of nanoscience to work at the molecular level, atom-by-atom, to create large structures with fundamentally new molecular organization.

(4) PROGRAM.—The term “Program” means the National Nanotechnology Program established under section 2.

(5) COUNCIL.—The term “Council” means the National Science and Technology Council or an appropriate subgroup designated by the Council under section 2.

(6) GRAND CHALLENGE.—The term “grand challenge” means a fundamental problem in science or engineering, with broad potential economic and scientific impact, the solution to which will require the application of nanotechnology research.

Mr. MCcAIN. Mr. President, I am pleased to join my colleagues, Senators ALLEN, WYDEN, HOLLINGS, and STEVENS in sponsoring this substitute amendment to S. 189, the 21st Century Nanotechnology Research and Development Act. I commend Senators ALLEN, WYDEN, HOLLINGS, and STEVENS for their leadership on this important legislation, and also thank Senators STEVENS, LOTT, and SUNUNU and Chairman BOEHLENT and Ranking Member HALL of the House Science Committee, for their work on this issue.

Nanotechnology is a truly revolutionary field of science. Scientists have been able to develop materials and systems with unique properties by manipulating structures and systems at the scale of 10^-9 meters, or 1/100,000 the width of a human hair. This basic research has the potential to benefit virtually every sector of our economy, including biotechnology, telecommunications, national security, manufacturing, and computers. Some experts have projected that sales of products based on nanotechnology will reach $1 trillion by 2015. No other international economic competitors have begun to focus on this field. For example, the European Union budgeted $1.2 billion for nanotechnology research in 2003.

This bill is designed to highlight the United States’ interest and efforts in this emerging technology. The bill would authorze a coordinated research program across the Federal Government through the National Nanotechnology Program. In addition, it would authorize funding for nanotechnology research at the National Science Foundation, the National Aeronautics and Space Administration, the National Institute of Standards and Technology (NIST), the Department of Energy, and the Environmental Protection Agency from fiscal year 2008 through fiscal year 2008.

This legislation is an affirmation that the United States will continue to play a leading role in the development of nanotechnology. It authorizes $784 million for fiscal year 2005 for five Federal agencies involved in nanotechnology research. Although other agencies are not included in this bill, I am hopeful that they will contribute to the National Nanotechnology Program. The legislation provides interagency coordination to the Federal Government’s nanotechnology research and development efforts. The establishment of a National Nanotechnology Coordination Office will infuse an organized, structured, and collaborative approach to this research. The legislation also calls for the development of a strategic plan that will provide a roadmap for the country’s research and development future.

Nanotechnology is a new frontier and we want to ensure that it is developed
Mr. WYDEN. Mr. President, I rise to clarify the legislative intent of S. 189, the 21st Century Nanotechnology Research and Development Act. In reviewing the section of the substitute text dealing with the purpose and definitions of fundamental research in nanotechnology that our bill references, I believe that they are not intended to limit research and development to the physical sciences and are intended to include a wide variety of research, including the biotechnology-nanotechnology Interface. Senator STEVENS, is that your reading of this legislation?

Mr. STEVENS. I agree with the Senator from Oregon. It is our intention to include research into the biotechnology-nanotechnology interface. We did not mention specific areas or research because we did not intend to be overly restrictive.

Mr. WYDEN. I would just like to take a moment to clarify some of the types of nanotechnology applications that are possible through the research involving biotechnology at the nano-level, which are encompassed by this legislation. These examples include applications ranging from industrial manufacturing to advances in medicine to breakthroughs in defense against terrorism.

For instance, biotechnology is spurring the development of proteins that will be capable of manufacturing biological structures on the nano-scale. This technology will allow the development of nanoelectronics such as micro-transistors and silicon chips. In the area of photonics there is potential for developing new micro-optical switches and optical micro-processing platforms.

Researchers recently discovered a first of its kind carbon-silicon compound in freshwater diatoms. This discovery promises to open the door to understanding the molecular process of biosilification, of the ways plants and animals build natural structures. This understanding may lead to applications ranging from low cost synthesis of advanced biomaterials to new treatments for osteoporosis.

Mr. STEVENS, thank you for your clarification.
Mr. STEVENS. These examples are exactly the type of research that we have intended to cover in this legislation. Beyond industrial applications there are many other potential health care applications of nanobiotechnology. I am particularly excited about the potential for nanotechnology in the area of systems biology and molecular imaging. Systems biology analyzes all of the elements in a system, rather than an individual cell, gene or protein. By applying nanotechnology to systems biology and using molecular imaging, it will be possible to achieve rapid diagnostic results by analyzing on a molecular level the signatures of thousands of genes and proteins. Moreover, the systems approach in combination with nanotechnology will speed up and greatly reduce the cost of discovering new drugs. This will lead to the advancement of predictive medicine and revolutionize the diagnosis, treatment and prevention of disease.

Given nanotechnology's tremendous potential in health care, I want to encourage the National Institutes of Health (NIH) to be proactive participants in the nanotechnology revolution. Although a specific authorization of appropriations for NIH is not included in this bill at the request of our House colleagues, it is expected that NIH will be an active participant in the National Nanotechnology Program.

Mr. WYDEN. I thank the distinguished Senator from Alaska for clarification of this matter and I wholeheartedly agree with him regarding the potential benefits of nanotechnology in the field of health care.

Mr. SUNUNU. Mr. President, this legislation is the product of many, many hours of debate and discussion. I appreciate the commitment of the Chairman of the Commerce Committee, Senator McCaIN, and the sponsors of the bill, Senators WyDEN and ALLEN, to try to address my concerns and accommodate my views on this bill. I appreciate the indulgence of the Ranking Member, Senator HOLLINGS, for his understanding and assistance on this bill. Through persistence and thoughtful consideration by a handful of interested Members in both bodies, an agreement was reached on a legislative framework provided under this bill. I look forward to working with them to ensure that Federal funds are spent appropriately. However the Congressmen's compromise creates redundant reporting requirements for various agencies within the Administration. By my count, the bill includes annual, biennial and triennial reporting obligations by the National Science and Technology Council, the National Nanotechnology Advisory Panel, and the National Academy of Sciences, respectively. These reports have a number of overlapping components that will result in the checking and re-checking of statistics and issues. It is important to note that Congressional studies and reporting requirements impose very significant costs on the reporting agencies, thereby draining funds from the very projects and research we are trying to fund.

S. 189 also authorizes the establishment of several interdisciplinary and specialized research centers on nanotechnology. The language of the bill is broad and I now ask the President for his consideration. I look forward to the multiple advances that will occur from the statutory framework provided under this bill. Our action today will signal to the research community the importance and significance we place on this field of study, and this will spur further investment by the private sector and hopefully lead to the technological breakthrough that will inspire greater innovation and economic growth.

Mr. LIEBERMAN. Mr. President, the emerging field of nanotechnology constitutes an opportunity for the U.S. to claim global leadership in a new frontier in science and technology that has the potential to transform every aspect of our lives. By manipulating matter at a molecular scale, nanotechnology will allow us to develop new materials and devices that have unique properties currently beyond the realm of conventional technology. Nanotechnology is what scientists and technology writers call an enabling technology—a tool that opens the door to new possibilities constrained only by physics and the limits of our imaginations. This field has the potential to affect our economy and quality of life since it has such broad prospective applications in so many different areas including medicine, electronics, energy, telecommunications, computing, and manufacturing. It has been estimated that the impact of nanotechnology on existing and emerging marketplaces will be in the trillions of dollars. In addition to creating new job opportunities, this exciting new initiative has the potential
to provide novel therapeutic treatments and a fundamental understanding of diseases including cancer. For example, research in building innovative tools to study biology at the nanometer scale will unlock mysteries of the devastating processes that was once taboo.

The new authorization legislation the Senate is passing today, which I am pleased to have played a role in, should be an important step in this effort.

Yet, despite the enormous potential that nanotechnology offers, it is not an area in which we have assumed uncontested leadership. From an international perspective, the United States faces the danger of falling behind its Asian and European counterparts in supporting the pace of nanotechnological advancement. While our Nation certainly possesses the raw resources and talent to lead the world in developing this technology, it is also clear that a long-term focus and sustained commitment, as well as new collaboration between Government, academia, and industry, will be needed to ensure our place at the head of the next wave of innovation.

In recognition of the need to support ongoing nanotechnology efforts and to spur new ones, I was pleased to join Senator Ron Wyden in cosponsoring the original “21st Century Nanotechnology Research and Development Act,” which was introduced this year S. 189. My staff worked with the Commerce Committee on the initial drafting of this bill, and I was able to assist in including parallel legislation in last year’s defense authorization P.L. 107-314, section 246 to help assure that Department of Defense research and development in nanotechnology works in concert with the civilian agencies covered by this bill. Much of the original Senate bill is retained in this final legislation. The revision and legislation we act on today, which we anticipate will also soon be approved by the House, will build on the efforts of the National Nanotechnology Initiative NNI, which was started under President Clinton and has received continued support under President Bush, to establish a comprehensive, intelligently coordinated program for addressing the full spectrum of challenges confronting a successful national science and technology field. In addition to funding, coordination, infrastructure development, technology transition, and social issues.

The time is now ripe to elevate the U.S. nanotechnology effort beyond the level of an Executive Branch initiative. Funding for nanotechnology will soon reach $1 billion a year, and the NNI currently attempts to coordinate programs across a wide range of Federal agencies and departments. This level of funding, in the context of the number of challenges that arise with so many diverse participants, require having a program that is based in statute, provided with greater support and coordination mechanisms, afforded a higher profile, and subjected to constructive Congressional oversight and support.

The final legislation closely tracks many of the recommendations of the National Research Council NRC, which completed its report on the NNI in 2002. The NRC report commended the leadership and multi-agency involvement of the NNI, and its recommendations included the establishment of an independent advisory panel. As the field of nanotechnology covers a wide variety of disciplines including engineering, physics, chemistry and life sciences, guidance is needed from a panel composed of experts from each of the disciplines. A comprehensive perspective is necessary for helping to set the directions and goals of the national program, including advice on the focus of research that should be conducted in the academia sector, as well as assistance in the transition of technology from academic into the private sector that will ensure the competitiveness of U.S. industry. Although members of the Presidents Council of Advisors on Science and Technology PCAST, which the President is likely to select as this section 4 in the final bill, are highly accomplished and esteemed, they are not necessarily steeped in the field of nanotechnology. Therefore, our expectation is that PCAST will set up its own nanotechnology panel of experts from both academia and industry representing the key nanotechnology disciplines. This independent panel should work in coordination with the National Science and Technology Council and the new Program Office particularly across stove-piped agency boundaries to better assure a fully integrated, crosscutting, interdisciplinary research effort. Otherwise, the promise of this research will not be realized.

To ensure that the United States takes the lead in this new and promising field of science and technology, we must provide for the organization and guidance necessary to foster interaction between Government, academia, and industry, so as to maximize the potential benefits of nanotechnology to our economy. This legislation provides a strong foundation and comprehensive framework that elicits contributions from all three sectors of our society in the development and growth of nanotechnology to the next level. I hope that we may all work together in a bipartisan fashion on implementing this bill to set the stage for U.S. economic growth over the next century.

I am proud to say that New York is playing a leading role in the development of nanotechnology, and is already seeing concrete benefits from the National Nanotechnology Initiative. Three of the six university-based centers of nanotechnology funded by the National Science Foundation in 2001 are located at New York’s world-class research centers at Cornell University, Columbia University and Rensselaer Polytechnic Institute. Long Island’s Brookhaven National Laboratory is the future home of the Center for Functional Nanomaterials, supported by the Department of Energy. The State of New York and International SEMATECH and its member companies are planning to provide approximately $400 million in support to create a next-generation computer chip research and development facility at the University at Albany-SUNY. All of these investments are creating the foundations for future economic growth and the creation of high-tech, high-wage jobs, including in upstate New York.
The 21st Century Nanotechnology Research and Development Act shows what this Nation is capable of when we come together and set aside partisan differences. The National Nanotechnology Initiative, launched by President Clinton in January 2000, and has continued to enjoy bipartisan support from President Bush and members of Congress.

I urge my colleagues to continue to pay attention to nanotechnology after this legislation is passed. In many respects, this legislation is only the first step. As President Clinton noted when unveiling the National Nanotechnology Initiative, realizing the full promise of this technology may take twenty years of sustained investment. America's lead in this critical technology is by no means assured. Moreover, this legislation will not result in an extra dime being devoted to nanotechnology research, unless the legislation is followed by steadfast support for federal research and development in the budget and appropriations process.

I hope that the Administration and the Congress look for ways to build on and strengthen the current initiative. I believe that there are many such opportunities. The National Institutes of Health have targeted a relatively modest amount of funding for the NNI, despite the broad range of nanotechnology applications for health and biology. In addition, I hope we can increase the Environmental Protection Agency's budget for nanotechnology because it has a role to play in a variety of settings, including pollution prevention. We should also explore ways to respond to calls for the development of clean sources of energy using nanotechnology. This legislation is a bold step in the direction of creating a brighter and more prosperous future for all Americans. In the years ahead, I look forward to continuing to work with my colleagues on both sides of the aisle to ensure the full development of this important initiative.

Mr. BINGAMAN. Mr. President, I rise to support the passage of S. 189, the 21st Century Nanotechnology Research and Development Act. I appreciate Senator Wyden's leadership on this issue and the cooperation of the House and the other sponsors of this legislation in responding to a number of concerns I had with the bill, in particular with the provisions of the bill authorizing programs at the U.S. Department of Energy. In the last Congress, I introduced legislation on this topic, S. 90, which was referred to the Committee on Energy and Natural Resources. That bill provided authorizations for nanotechnology programs in the Department of Energy which are now incorporated, in a streamlined form, in this bill. This is a good bill for our country's high technology future, and I urge its prompt passage.

Mr. REID. Mr. President, I make the following parliamentary inquiry: This bill, which deals with nanotechnology programs across the Federal Government, was referred to the Committee on Commerce, Science and Transportation. It is not true the Senate procedures provide for a case in which a future bill amending a particular public law might be referred to a different committee than the one that originally designed the public law, that if that future bill consisted of amendments to parts of the public law that were in the jurisdiction of the different committee; is that true?

The PRESIDING OFFICER. That is correct.

Mr. REID. I thank the Chair.

Mr. FRIST. Mr. President, I ask unanimous consent that the Allen-Wyden amendment at the desk be agreed to, the committee-reported substitute amendment, as amended, be agreed to, the bill, as amended, be read the third time and passed, the motions to reconsider be laid upon the table en bloc, and that any statements relating to the bill be printed in the RECORD.

The PRESIDING OFFICER. Without objection, it is so ordered.

The amendment (No. 2202) was agreed to.

The amendment (No. 2202) was agreed to, the bill, as amended, was agreed to.

The bill (S. 189), as amended, was read the third time and passed, as follows:

S. 189

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 "21st Century Nanotechnology Research and Development Act".

SEC. 2. NATIONAL NANOTECHNOLOGY PROGRAM.

(a) NATIONAL NANOTECHNOLOGY PROGRAM.—

The President shall implement a National Nanotechnology Program. Through appropriate action, the National Nanotechnology Coordination Office established in section 3, the Program shall—

(1) establish the goals, priorities, and metrics for evaluation for Federal nanotechnology research, development, and other activities;

(2) invest in Federal research and development programs in nanotechnology and related sciences to achieve those goals; and

(3) provide for interagency coordination of Federal nanotechnology research, development, and other activities.

(b) PROGRAM ACTIVITIES.—The activities of the Program shall include—

(1) developing a fundamental understanding of matter that enables control and manipulation at the nanoscale;

(2) providing grants to individual investigators and interdisciplinary teams of investigators;

(3) establishing a network of advanced technology user facilities and centers;

(4) establishing, on a merit-reviewed and competitive basis, interdisciplinary nanotechnology research centers, which shall—

(A) interact and collaborate to foster the exchange of technical information and best practices; and

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

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

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

(e) to the greatest extent possible, be established in geographically diverse locations to encourage the high historically Black Colleges and Universities that are part of institutions as defined in section 322(3) of the Higher Education Act of 1965 (20 U.S.C. 1067k(3)), and include institutions located in States participating in the Experimental Program to Stimulate Competitive Research (EPSCoR);

(5) ensuring United States global leadership in the development and application of nanotechnology;

(6) advancing the United States productivity and industrial competitiveness through stable, consistent, and coordinated investments in long-term scientific and engineering research in nanotechnology;

(7) accelerating the deployment and application of nanotechnology research and development in the private sector, including startup companies;

(8) encouraging interdisciplinary research, and ensuring that processes for solicitation and evaluation of proposals to the Program encourage interdisciplinary projects and collaborations;

(9) providing effective education and training for researchers and professionals skilled in the interdisciplinary perspectives necessary for nanotechnology so that a true interdisciplinary research culture for nanoscale science, engineering, and technology can emerge;

(10) ensuring that ethical, legal, environmental, and other appropriate societal concerns related to nanotechnology are considered during the development of nanotechnology by—

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

(B) requiring that interdisciplinary nanotechnology research centers established under paragraph (4) include activities that address societal, ethical, and environmental concerns;

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

(D) providing, through the National Nanotechnology Coordination Office established in section 3, for public input and outreach to be integrated into the Program by the convening of regular and ongoing public discussions, through mechanisms such as citizens' panels, consensus conferences, and educational events, as appropriate; and

(9) encouraging research on nanotechnology advances that utilize existing processes and technologies.

(c) PROGRAM MANAGEMENT.—The National Science and Technology Council shall oversee planning, management, and coordination of the Program. The Council, itself or through an appropriate subgroup it designates or establishes, shall—

(1) establish goals and priorities for the Program, based on national needs for a set of broad applications of nanotechnology;
(2) establish program component areas, with specific priorities and technical goals, that reflect the goals and priorities established for the Program;
(3) develop and implement a strategy for the coordination of the Program, including the activities of the Defense Nanotechnology Research and Development Program established under section 246 of the Bob Stump National Defense Authorization Act for Fiscal Year 2003 (Public Law 107-314) and the National Institutes of Health;
(4) develop, within 12 months after the date of enactment of this Act, and update every 3 years thereafter, a strategic plan to guide the activities described under subsection (b), meet with the National Advisory Coordination Office, with a Director and full-time staff, which shall —
(A) provide technical and administrative support to the Council and the Advisory Panel;
(B) serve as the point of contact on Federal nanotechnology activities for government organizations, academia, industry, professional societies, State nanotechnology programs, interested citizen groups, and others to exchange technical and programmatic information;
(C) conduct public outreach, including dissemination of findings and recommendations of the Advisory Panel, as appropriate; and
(D) promote access to and early application of the technologies, innovations, and expertise derived from Program activities to agency missions and systems across the Federal Government, the United States industry, including startup companies.

(b) FUNDING.—The National Nanotechnology Coordination Office shall be established through interagency funding in accordance with section 631 of Public Law 108-7.

(c) REPORT.—Within 90 days after the date of enactment of this Act, the Director of the Office of Science and Technology Policy shall submit to the Senate Committee on Commerce, Science, and Transportation, and the House of Representatives Committee on Science, and the National Nanotechnology Coordination Office. The report shall include —
(1) the amount of funding required to adequately fund the Office;
(2) the adequacy of existing mechanisms to fund this Office;
(3) the actions taken by the Director to ensure stable funding of this Office.

SEC. 4. ADVISORY PANEL.

(a) GENERAL.—The President shall establish an Advisory Panel to advise the National Nanotechnology Advisory Panel.

(b) QUALIFICATIONS.—The Advisory Panel established or designated by the President under subsection (a) shall consist primarily of members from academic institutions and industry. Members of the Advisory Panel shall be qualified by education, science, and experience to provide advice and recommendations on nanotechnology research, development, demonstrations, education, technology transfer, commercial application, or social and ethical considerations.

(c) DUTIES.—The Advisory Panel shall advise the President concerning activities and matters relating to the Program, including assessing —
(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) the program component areas, priorities, and technical goals developed by the Council in meeting its obligation to improve United States leadership in nanotechnology;
(6) the coordination, implementation, and activities of the Program;
(7) whether societal, ethical, legal, environmental, and workforce concerns are adequately addressed by the Program;
(8) the Program’s success in fostering interdisciplinary research and development in nanotechnology and nanomanufacturing.

(d) REPORTS.—The Advisory Panel shall report, not less frequently than every 2 fiscal years, to the President on its assessments under subsection (c) and its recommendations for ways to improve the Program.

SEC. 5. TRIENNIAL EXTERNAL REVIEW OF THE NATIONAL NANOTECHNOLOGY PROGRAM.

(a) IN GENERAL.—The Director of the National Nanotechnology Coordination Office shall enter into an arrangement with the National Research Council of the National Academy of Sciences to conduct a triennial evaluation of the Program, including —
(1) an evaluation of the technical accomplishments of the Program and other appropriate committees of the Congress;
(2) a review of whether the Program has achieved the goals under the metrics established by the Council;
(3) a review of the Program’s management and coordination across agencies and disciplines;
(4) a review of the funding levels at each agency for the Program’s activities and the ability of each agency to achieve the Program’s stated goals with that funding;
(5) an evaluation of whether the Program has contributed to the President’s success in transferring technology to the private sector;
(6) an evaluation of whether the Program has contributed to the President’s success in transferring technology to the private sector;
(7) the Program’s success in fostering interdisciplinary research and development;
(8) an evaluation of whether the Program has contributed to the President’s success in transferring technology to the private sector;
(9) recommendations for new or revised Program goals; and
(10) recommendations for new or revised Program goals.

(b) ANNUAL REPORT.—The Council shall prepare an annual report, to be submitted to the President and the Congress, on its evaluation of the activities and accomplishments of the Program, the National Nanotechnology Advisory Panel, and the National Nanotechnology Coordination Office, with a Director and full-time staff, for the fiscal year covered by the report.

(c) COMMUNICATION.—The Council shall transmit a copy of each report required under subsection (a) or (b) to the Chair and ranking member of each committee of the Congress having jurisdiction over the activities and programs of the Council.

(d) SUNSET.—The President shall submit to the Senate Committee on Commerce, Science, and Transportation, and the House of Representatives Committee on Science, and other appropriate committees of the Congress, a report on the results of the triennial evaluation of the Program, including —
(1) the planned actions of the President to implement the recommendations of the evaluation;
(2) the proposed actions of the Congress to implement the recommendations of the evaluation; and
(3) an update of the Program’s progress toward the goals of the evaluation.
nanotechnology research and development activities; 
(10) recommendations for improved metrics to evaluate the success of the Program in accomplishing the Program goals; 
(11) a review of the performance of the National Nanotechnology Coordination Office and its efforts to promote access to and early application of innovations and expertise derived from Program activities to agency missions and systems across the Federal Government and to United States industry; and 
(12) an analysis of the relative position of the United States compared to other nations with respect to nanotechnology research and development, including the identification of any critical research areas where the United States should be the world leader to best achieve the goals of the Program; and 
(13) an analysis of the current impact of nanotechnology on the United States economy and recommendations for increasing its future impact.

(b) Study on Molecular Self-Assembly.—As part of the first triennial review conducted in accordance with subsection (a), the National Research Council shall conduct a one-time study to determine the technical feasibility of molecular self-assembly for the manufacture of materials and devices at the molecular scale.

(c) Study on the Responsible Development of Nanotechnology.—As part of the first triennial review conducted in accordance with subsection (a), the National Research Council shall conduct a one-time study to assess the need for standards, guidelines, or strategies for ensuring the responsible development of nanotechnology, including, but not limited to—
(1) self-replicating nanoscale machines or devices; 
(2) the release of such machines in natural environments; 
(3) encryption; 
(4) the development of defensive technologies; 
(5) the use of nanotechnology in the enhancement of human intelligence; and 
(6) the use of nanotechnology in developing artificial intelligence.

d) Evaluation to Be Transmitted to Congress.—The Director of the National Nanotechnology Coordination Office shall transmit the results of any evaluation, which is made arrangements under subsection (a) to the Advisory Panel, the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Science, Space, and Technology Committees. The first such evaluation shall be transmitted no later than June 10, 2005, with subsequent evaluations transmitted to the Committees every 3 years thereafter.

SEC. 6. AUTHORIZATION OF APPROPRIATIONS.

(a) National Science Foundation.—There are authorized to be appropriated to the Director of the National Science Foundation to carry out the Director’s responsibilities under this Act—
(1) $34,100,000 for fiscal year 2005; 
(2) $37,500,000 for fiscal year 2006; 
(3) $40,000,000 for fiscal year 2007; and 
(4) $42,300,000 for fiscal year 2008.

(b) National Institute of Standards and Technology.—There are authorized to be appropriated to the National Institute of Standards and Technology to carry out the Director’s responsibilities under this Act—
(1) $65,000,000 for fiscal year 2005; 
(2) $75,000,000 for fiscal year 2006; 
(3) $80,000,000 for fiscal year 2007; and 
(4) $84,600,000 for fiscal year 2008.

(c) Environmental Protection Agency.—There are authorized to be appropriated to the Administrator of the Environmental Protection Agency to carry out the Administrator’s responsibilities under this Act—
(1) $5,500,000 for fiscal year 2005; 
(2) $6,050,000 for fiscal year 2006; 
(3) $6,433,000 for fiscal year 2007; and 
(4) $6,800,000 for fiscal year 2008.

SEC. 7. DEPARTMENT OF COMMERCE PROGRAMS.

(a) NIST Programs.—The Director of the National Institute of Standards and Technology shall—
(1) as part of the Program activities under section 2(b)(7), establish a program to conduct basic research on issues related to the development and deployment of nanotechnology, including metrology; reliability and quality assurance; processes control; and manufacturing best practices; and 
(2) utilize the Manufacturing Extension Partnership program to the extent possible to ensure that the research conducted under paragraph (1) reaches small- and medium-sized manufacturers.

(b) CLEARINGHOUSE.—The Secretary of Commerce or his designee, in consultation with the National Nanotechnology Coordination Office and in coordination with the National Center for Nanoscience and Technology, shall establish a clearinghouse of information related to commercialization of nanotechnology research, including information relating to activities by regional, State and local commercial entities, including information relating to activities by United States researchers on a competitive, of a center to—
(1) encourage, conduct, coordinate, commission, collect, and disseminate research on new manufacturing technologies for materials, devices, and systems with new combinations of characteristics, such as, but not limited to, strength, toughness, density, conductivity, flame retardance, and membrane separation characteristics; and 
(2) develop mechanisms to transfer such manufacturing technologies to United States industries.

(c) REPORTS.—The Council, through the Director of the National Nanotechnology Coordination Office, shall submit to the Senate Committee on Commerce, Science, and Transportation and the House of Representatives Committee on Science, within 6 months after the date of enactment of this Act, a report identifying which agency shall be the lead agency and which other agencies, if any, will be responsible for overseeing the Centers described in this section; and 
(2) within 18 months after the date of enactment of this Act, a report describing how the Centers described in this section have been established.

SEC. 8. DEPARTMENT OF ENERGY PROGRAMS.

(a) Research Consortia.—
(1) Department of Energy Program.—The Secretary of Energy shall establish a program to support, on a merit-reviewed and competitive basis, consortia to conduct interdisciplinary nanotechnology research and development designed to integrate newly developed nanotechnology and microfluidic tools with systems biology and molecular imaging.

(2) Authorization of Appropriations.—Of the sums authorized for the Department of Energy under section 6(b), $25,000,000 shall be used for each fiscal year from 2005 through 2008 to carry out this section. Of these amounts, not less than $10,000,000 shall be provided to at least 1 consortium for each fiscal year.

(b) Research Centers and Major Instrumentation.—The Secretary of Energy shall carry out projects to develop, plan, construct, acquire, operate, or support special research centers and major facilities for the responsible research, development, and application of nanotechnology, including the purchase of equipment, materials, and supplies.