

scope as described in the budget justifications and none of the funds provided may be used to cover administrative costs at other Departmental sites. The additional \$10,000,000 shall be used for construction at the Paducah, Kentucky facility. The additional funding shall have no effect on the amounts available for the Portsmouth, Ohio facility.

### SCIENCE

Appropriations, 2003 .....	\$3,261,328,000
Budget estimate, 2004 .....	3,310,935,000
Committee recommendation .....	3,360,435,000

The Science account funds investment in basic research critical to the success of the Department's missions in national security, energy security and economic security. Programs funded under this account perform a leadership role in advancing the frontiers of knowledge in the physical sciences and areas of biological, environmental and computational sciences. The programs are also responsible for providing world-class research facilities for the Nation's broader scientific enterprise. The Science account includes the following major programs: high energy physics, nuclear physics, biological and environmental research, basic energy sciences, advanced scientific computing research, science laboratories infrastructure, and fusion energy sciences.

#### GOVERNMENT FUNDING OF THE PHYSICAL SCIENCES

Investment in the physical sciences and engineering plays a critical role in enabling U.S. technological innovation and global economic leadership. It is essential to the development and utilization of our energy resources, as well as innovations in the areas of defense, the environment, communications and information technologies, health care and much more. Over the past 50 years, half of U.S. economic growth has come from prior investment in science and technological innovation. Life expectancy has grown from 55 years in 1900 to nearly 80 years today.

The Department of Energy is the leading source of Federal investment for R&D facilities and fundamental research in the physical sciences. Yet investment in the Department's R&D has declined in constant dollars from \$11,200,000,000 in 1980 to \$7,700,000,000 in 2001. As a percentage of GDP, total Federal investment in the physical sciences and engineering has been cut roughly in half since 1970.

Shrinking investment in the physical sciences and engineering poses serious risks to DOE's ability to perform its mission. It also threatens the Nation's science and technology enterprise. DOE faces a shortage of nearly 40 percent in its technical workforce over the next 5 years. To meet its needs, DOE must compete with industry for a shrinking pool of skilled workers, many of whose leaders also report serious shortages of scientists and engineers.

American educational institutions are failing to attract sufficient numbers of U.S. students, especially women and minorities, into undergraduate and graduate programs in the physical sciences and engineering. For these skills the United States is now more heavily

dependent on foreign nations than ever before. The H1-B visa has become a main element of U.S. technology policy.

As fewer foreign students choose to pursue their education in the United States, and too few U.S. students enter these fields, our vulnerability grows. The National Science Foundation reports that between 1996 and 1999, the number of Ph.D.s in science and engineering awarded to foreign students declined by 15 percent. Only 5 percent of U.S. students now earn bachelors degrees in natural science or engineering. Since 1986, the total number of bachelors degrees in engineering is down 15 percent. Between 1994 and 2000, the number of Ph.D.s awarded in physics in the United States declined by 22 percent.

These trends must be reversed. Many DOE user facilities do not operate at their designed capacity. As a result, opportunities and momentum are lost as researchers and students encounter barriers to the pursuit of their studies, including promising research opportunities at the boundaries of the life sciences, physical sciences, engineering, and computer sciences. Future U.S. global leadership and technological leadership will rely upon today's investment in research in all of the science and engineering disciplines.

#### HIGH ENERGY PHYSICS

Appropriations, 2003 .....	\$722,264,000
Budget estimate, 2004 .....	737,978,000
Committee recommendation .....	737,978,000

The Committee recommendation includes \$737,978,000 for high energy physics, an increase of \$15,714,000 over the current year level.

The high energy physics program focuses on gaining insights into the fundamental constituents of matter, the fundamental forces in nature, and the transformations between matter and energy at the most elementary level. The program encompasses both experimental and theoretical particle physics research and related advanced accelerator and detector technology R&D. The primary mode of experimental research involves the study of collisions of energetic particles using large particle accelerators or colliding beam facilities.

#### NUCLEAR PHYSICS

Appropriations, 2003 .....	\$381,872,000
Budget estimate, 2004 .....	389,430,000
Committee recommendation .....	389,430,000

The Committee recommends \$389,430,000 for nuclear physics, an increase of \$7,558,000 over the current year level.

The nuclear physics program supports and provides experimental equipment to qualified scientists and research groups conducting experiments at nuclear physics accelerator facilities. These facilities provide new insights and advance our knowledge of the nature of matter and energy and develop the scientific knowledge, technologies and trained manpower needed to underpin the Department's nuclear missions. The Committee supports the Continuous Electron Beam Accelerator Facility at the Thomas Jefferson National Accelerator Facility and encourages the Jefferson Lab to increase operational time and thereby reduce the significant backlog

of peer reviewed and approved scientific experiments and begin work toward the 12 GeV upgrade. Therefore, the Committee urges the Department to grant approval and include adequate funds in its fiscal year 2005 request to continue this process.

#### BIOLOGICAL AND ENVIRONMENTAL RESEARCH

Appropriations, 2003 .....	\$506,685,000
Budget estimate, 2004 .....	499,535,000
Committee recommendation .....	534,035,000

The Committee recommendation includes \$534,035,000 for biological and environmental research, an increase of \$34,500,000 over the current year level.

The biological and environmental research program develops the knowledge base necessary to identify, understand, and anticipate the long-term health and environmental consequences of energy use and development. The program utilizes the Department's unique scientific and technological capabilities to solve major scientific problems in the environment, medicine, and biology. The Committee recommendation includes an additional \$3,000,000 for the Environmental Molecular Sciences Laboratory at Pacific Northwest National Laboratory, Washington and \$7,776,000 for the Savannah River Ecology Laboratory. The Committee recommendation includes the budget request of \$17,496,000 for low dose radiation research.

*Genomes to Life.*—The Committee recommendation continues its strong support of the “genomes to life” activities aimed at understanding the composition and function of biochemical networks that carry out essential processes of living organisms. This activity is funded at \$69,039,000, an increase of \$10,000,000 over the request.

*Energy-Water Supply Technologies.*—The Committee recommendation includes an additional \$15,500,000 to support a research and demonstration program to study energy-related issues associated with water resources and issues associated with sustainable water supplies for energy production. The recommendation includes \$6,000,000 to continue the arsenic removal research in conjunction with the American Water Works Association Research Foundation as begun in fiscal year 2003; \$4,000,000 in support of desalination research consistent with the Desalination and Water Purification Technology Roadmap in partnership with the Bureau of Reclamation; and \$1,500,000 to support the public/private ZeroNet Energy-Water Initiative. The Committee recommendation also includes \$4,000,000 to fund a demonstration of a stand-alone stirling engine that will run on any fuel. The engine shall be a portable, closed-cycle, reciprocating, and regenerative heat engine used in conjunction with an electrical generator to convert heat, external to the engine, into electricity and usable thermal power. This engine should be combined with an advanced vapor compression distillation system for making drinking water from virtually any water source. The water system shall remove all contaminants, including volatile compounds. The goal of the combined stirling and water system is to provide safe water and power in remote rural areas. The value and efficiency of the combined system will come from using the emission free engine's waste heat to help power the

water purifier. The demonstration of this technology should take place on Native American reservations.

*Molecular Medicine.*—The Committee recommendation includes an additional \$6,000,000 for programs that bring together PET imaging, systems biology and nanotechnology to develop new molecular imaging probes. These probes should provide a biological diagnosis of disease that is informative of the molecular basis of disease and specific for guiding the development of new molecular therapies. The programs must bring together chemists, physicists, biologists and imaging scientists to produce new technologies and science in the stated area. The particular disease orientation is in cancers such as breast, prostate, colorectal, melanoma and others and degenerative neurological disorders such as Alzheimer's and Parkinson's diseases.

The Committee is concerned about consequence mitigation activities and public health impacts associated with the threat of any radiological event and strongly encourages the Department to develop therapeutic radiological countermeasures to protect against exposure to the effects of ionizing radiation. The Committee is aware of the potential of inositol signaling molecules as a therapy for exposure to ionizing radiation and encourages the Department to support research of this emerging technology. The Committee recommends the Science and Technology Division of the Department of Energy fund medical therapy research and other treatment options to protect the public health against radiation exposure.

#### BASIC ENERGY SCIENCES

Appropriations, 2003 .....	\$1,023,305,000
Budget estimate, 2004 .....	1,008,575,000
Committee recommendation .....	1,008,575,000

The Committee recommendation includes \$1,008,575,000, the same as the budget request.

The basic energy sciences [BES] program funds basic research in the physical, biological and engineering sciences that support the Department's nuclear and non-nuclear technology programs. The BES program is responsible for operating large national user research facilities, including synchrotron light and neutron sources, a combustion research facility, as well as smaller user facilities such as materials preparation and electron microscopy centers. The BES program supports a substantial basic research budget for materials sciences, chemical sciences, energy biosciences, engineering and geosciences.

#### *Research*

The Committee recommendation includes \$788,625,000, the amount of the request, for materials sciences, engineering research, chemical sciences, geosciences, and energy biosciences.

#### *Construction*

*Spallation Neutron Source.*—The Committee recommendation includes the budget request of \$124,600,000 to continue construction at Oak Ridge National Laboratory for the Spallation Neutron Source [SNS] to meet the Nation's neutron scattering needs.

*Nanoscale Science Research Centers.*—The Committee recommendation supports the high priority given to nanoscale research and has included the budget request totaling \$87,850,000 for the nanoscale science research centers at Brookhaven National Laboratory, Lawrence Berkeley National Laboratory, Oak Ridge National Laboratory, and the joint effort between Sandia National Laboratories and Los Alamos National Laboratory.

#### ADVANCED SCIENTIFIC COMPUTING RESEARCH

The Committee recommendation provides \$183,490,000 for advanced scientific computing research, an increase of \$10,000,000 over the current year level.

The Advanced Scientific Computing Research [ASCR] program supports advanced computational research—applied mathematics, computer science, and networking—to enable the analysis, simulation and prediction of complex physical phenomena. The program also supports the operation of large supercomputer user facilities.

#### SCIENCE LABORATORIES INFRASTRUCTURE

The Committee recommends \$48,590,000, an increase of \$5,000,000 for Oak Ridge National Laboratory infrastructure. The program supports infrastructure activities at the five national labs under the direction of the Office of Science.

#### FUSION ENERGY SCIENCES

Appropriations, 2003 .....	\$248,375,000
Budget estimate, 2004 .....	257,310,000
Committee recommendation .....	257,310,000

The Committee recommendation for fusion energy sciences is \$257,310,000, an amount that is equal to the budget request.

The fusion energy sciences program supports research emphasizing the underlying basic research in plasma and fusion sciences, with the long-term goal of harnessing fusion as a viable energy source.

*International Thermonuclear Experimental Reactor.*—The Committee recommendation includes the budget request of \$1,990,000 to allow the Department to enter multilateral international negotiations aimed at building the International Thermonuclear Experimental Reactor [ITER], a burning plasma physics experiment many view as an essential next step toward eventually developing fusion as a commercially viable energy source. Reasonably conservative estimates suggest that the United States' participation in ITER will require approximately \$1,500,000,000 over the next 10 years in direct contributions to the construction of ITER and in supporting science. The Department's request of less than \$2,000,000 in direct support of the ITER project for fiscal year 2004 certainly leads the Committee to question the Department's commitment to supporting ITER without prejudice or damage to alternative fusion technologies, much less other Departmental science programs.

The Department's proposed fiscal year 2004 budget proposes to cut severely long-term activities in fusion technology and advanced design that will have significant impact on the ultimate attractiveness of fusion power. The Committee recommends that,

within available funds, the Department should make adjustments to redress the imbalance resulting from these cuts.

#### SAFEGUARDS AND SECURITY

The Committee recommendation provides \$51,887,000 for safeguards and security, an increase of \$3,760,000 over the request.

The safeguards and security line identifies the funding necessary for the physical protection, protective forces, physical security, protective systems, information security, cyber security, personnel security, materials control and accountability and program management activities for national laboratories and facilities of the Office of Science.

#### SCIENCE WORKFORCE DEVELOPMENT

The Committee recommendation provides \$6,470,000 for science workforce development, an increase of \$1,045,000 from the current year level.

The science workforce development program provides limited funding to train young scientists, engineers, and technicians to meet the demand for a well trained scientific and technical workforce, including the teachers that educate the workforce. The Committee encourages the Department of Energy to provide funds and technical expertise for high school students to participate in the 2004 For Inspiration and Recognition of Science and Technology [FIRST] Robotics competition. FIRST has proven to be a valuable program to introduce and mentor students in math and science.

#### SCIENCE PROGRAM DIRECTION

The Committee recommendation provides \$147,053,000 for science program direction, an increase of \$11,554,000 from the current year level.

#### NUCLEAR WASTE DISPOSAL FUND

Appropriations, 2003 .....	\$144,058,000
Budget estimate, 2004 .....	161,000,000
Committee recommendation .....	140,000,000

The Committee recommendation includes \$425,000,000 for nuclear waste disposal. Of that amount, \$140,000,000 is derived from the nuclear waste fund, and \$285,000,000 shall be available from the "Defense nuclear waste disposal" account.

The Committee has provided \$2,500,000 for the State of Nevada and \$8,000,000 for affected units of local government in accordance with the statutory restrictions contained in the Nuclear Waste Policy Act. These funds are direct payments, not grants or cooperative agreements, and are available until expended. The failure of the Department to request any funding for state or county oversight programs in fiscal year 2004 indicates a disturbing lack of support for congressionally-mandated programs to identify impacts, to make comments and recommendations to the Secretary, and to provide information about the repository to local residents, particularly concerning policy developments at the national level. The Committee strongly urges the Department to include funding for states and affected units of local government in the fiscal year 2005

## DEPARTMENT OF ENERGY—Continued

[In thousands of dollars]

Project title	Budget estimate	Committee recommendation
Subtotal, Non-Defense Environmental Management .....	.....	.....
Use of prior year balances .....	.....	.....
<b>TOTAL, NON-DEFENSE ENVIRONMENTAL MANAGEMENT .....</b>	<b>.....</b>	<b>.....</b>
<b>URANIUM ENRICHMENT DECONTAMINATION AND DECOMMISSIONING FUND</b>		
Decontamination and decommissioning .....	367,124	370,124
Uranium/thorium reimbursement .....	51,000	26,000
<b>TOTAL, URANIUM ENRICHMENT D&amp;D FUND .....</b>	<b>418,124</b>	<b>396,124</b>
<b>NON-DEFENSE ENVIRONMENTAL SERVICES</b>		
Community and regulatory support .....	1,034	1,034
Environmental cleanup projects .....	43,842	43,842
Non-closure environmental activities .....	160,445	160,445
Construction: 02-U-101 Depleted uranium hexafluoride conversion project, Paducah, KY and Portsmouth, OH .....	86,800	96,800
<b>TOTAL, NON-DEFENSE ENVIRONMENTAL SERVICES .....</b>	<b>292,121</b>	<b>302,121</b>
<b>URANIUM FACILITIES MAINTENANCE AND REMEDIATION</b>		
Uranium Enrichment Decontamination and Decommissioning Fund:		
Decontamination and decommissioning .....	.....	.....
Uranium/thorium reimbursement .....	.....	.....
Total, Uranium enrichment D&D fund .....	.....	.....
Other Uranium Activities:		
Maintenance and pre-existing liabilities .....	.....	.....
02-U-101 Depleted uranium hexafluoride conversion project, Paducah, KY and Portsmouth, OH .....	.....	.....
96-U-201 DUF6 cylinder storage yard, Paducah, KY .....	.....	.....
Total, Other uranium activities .....	.....	.....
Use of prior year balances .....	.....	.....
<b>TOTAL, URANIUM FACILITIES MAINTENANCE AND REMEDIATION .....</b>	<b>.....</b>	<b>.....</b>
<b>SCIENCE</b>		
High energy physics .....	.....	.....
Research & Technology .....	.....	.....
Facility operations .....	.....	.....
Proton accelerator-based physics .....	399,494	399,494
Electron accelerator-based physics .....	159,486	159,486
Non-accelerator physics .....	43,000	43,000
Theoretical physics .....	42,256	42,256
Advanced technology R&D .....	81,242	81,242
Subtotal .....	725,478	725,478
Construction: 98-G-304 Neutrinos at the main injector, Fermilab .....	12,500	12,500
Total, High energy physics .....	737,978	737,978
Nuclear physics .....	389,430	389,430
Biological and environmental research .....	499,535	534,035
Construction: 01-E-300 Laboratory for Comparative and Functional Genomics, ORNL .....	.....	.....

## DEPARTMENT OF ENERGY—Continued

[In thousands of dollars]

Project title	Budget estimate	Committee recommendation
Total, Biological and environmental research .....	499,535	534,035
Basic energy sciences:		
Research:		
Materials sciences and engineering research .....	567,711	567,711
Chemical sciences, geosciences and energy biosciences .....	220,914	220,914
Engineering and geosciences .....		
Energy biosciences .....		
Subtotal, Research .....	788,625	788,625
Construction:		
04–R–313–Nanoscale science research center, the molecular foundry .....	35,000	35,000
04–R–314 Nanoscale science research center, the center for integrated non-technologies, SNL/LASL .....	29,850	29,850
03–SC–002 Project engineering & design (PED) SLAC .....	7,500	7,500
03–R–312 Center for nanophase materials sciences, ORNL .....	20,000	20,000
03–R–313 Center for Integrated Nanotechnology .....		
02–SC–002 Project engineering and design (VL) .....	3,000	3,000
99–E–334 Spallation neutron source (ORNL) .....	124,600	124,600
Subtotal, Construction .....	219,950	219,950
Total, Basic energy sciences .....	1,008,575	1,008,575
Advanced scientific computing research .....	173,490	183,490
Energy research analyses .....		
Science laboratories infrastructure:		
Infrastructure support .....	1,520	1,520
Oak Ridge landlord .....	5,079	10,079
Excess facilities disposal .....	5,055	5,055
Construction:		
04–SC–001 Project engineering and design (PED), various locations .....	2,000	2,000
03–SC–001 Science laboratories infrastructure project engineering and design (PED), various loc .....		
MEL–001 Multiprogram energy laboratory infrastructure projects, various locations .....	29,936	29,936
02–SC–001 Multiprogram energy laboratories, project engineering design, various locations .....		
Subtotal, Construction .....	31,936	31,936
Total, Science laboratories infrastructure .....	43,590	48,590
Fusion energy sciences .....	257,310	257,310
Safeguards and security .....	48,127	51,887
Science workforce development .....	6,470	6,470
Science program direction:		
Field offices .....	83,802	80,102
Headquarters .....	58,217	58,217
Science education .....		
Technical information management program .....	7,774	7,714
Energy research analyses .....	1,020	1,020
Total, Science program direction .....	150,813	147,053
Subtotal, Science .....	3,315,318	3,364,818
General reduction/use of prior year balances .....		
Less security charge for reimbursable work .....	– 4,383	– 4,383
Supplemental appropriations (Public Law 108–11) .....		
<b>TOTAL, SCIENCE .....</b>	<b>3,310,935</b>	<b>3,360,435</b>