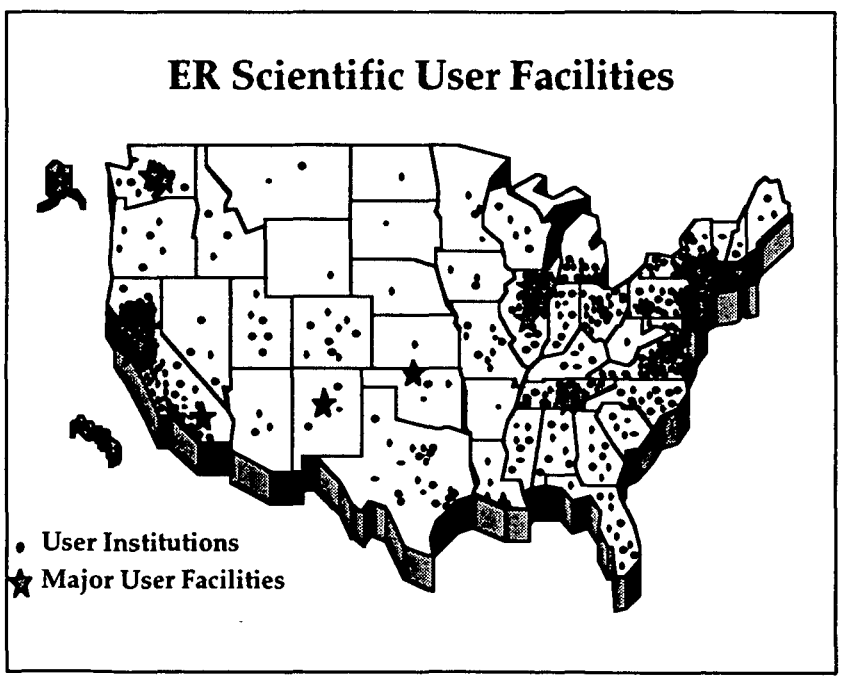
Mission

The Office of Energy Research (ER) invests in basic research to enable the Department to meet its science and technology intensive missions. Our programs produce scientific and technical knowledge needed to develop energy technology options. They provide understanding of the health and environmental implications of energy production and use. They maintain U.S. leadership in understanding the fundamental nature of energy and matter. ER programs provide and operate the large scale facilities required in natural sciences to ensure a competitive U.S. position in the search for knowledge. They help ensure the availability of scientific talent for future growth. These programs will help expand the Nation's human and intellectual resources to ensure that America's capabilities for scientific and technological innovation are constantly replenished.



Our research covers an unusually broad spectrum of scientific disciplines, including materials sciences, chemical sciences, engineering sciences, geosciences, energy biosciences, computational and applied mathematical sciences, high energy and nuclear physics, fusion energy science, biological and biomedical sciences, and environmental science. Over the past several years under the Scientific Facilities Initiative, started in FY 1996, ER has improved access to its basic research facilities for scientists in these fields.

ER's activities comprise over 95 percent of the science and technology business line of the DOE Strategic Plan, *Fueling a Competitive Economy*. ER programs support several thousand individual projects and hundreds of laboratories, universities, and other research facilities through-out the United States. Through direct support and access to our user facilities, ER enables multi-disciplinary research on important national problems and supports individual investigations by scientists and engineers in many disciplines.

Basic research supported by ER is increasingly important to America. Some of the biggest U.S. corporations have cut back sharply on research into 'basic science'--the exploration of how nature works at a fundamental level--to pursue short-term goals and to commercialize products more quickly. As 16 chairpersons and CEO's of major U.S. corporations wrote to the Congress, "History has shown that it is Federally sponsored research that provides the truly patient capital needed to carry out basic research and create an environment for inspired risk-taking that is essential to

technological discovery. " ER's unique stewardship of areas of basic research, for example, plasma science, accelerator science, and nuclear medical applications help improve the everyday quality of life as they advance science.

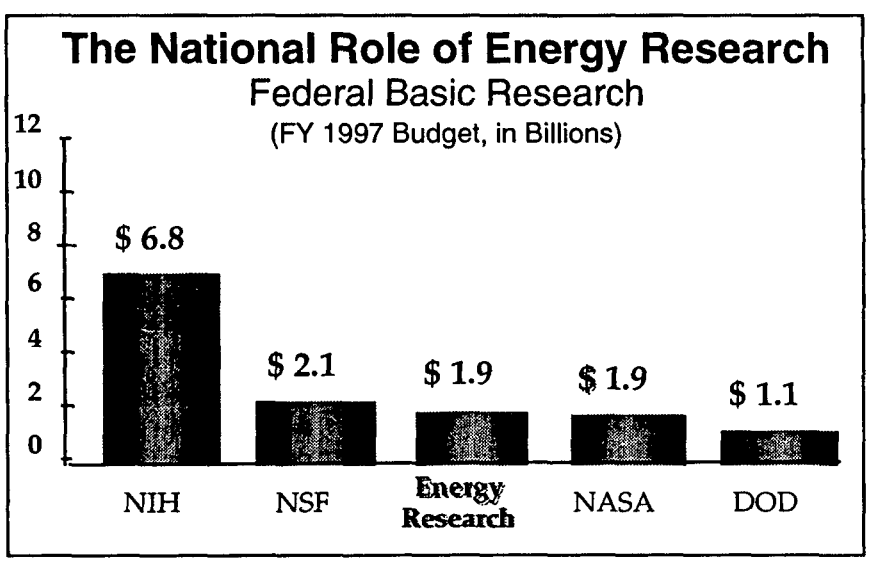
ER supports the Federal Government's third largest basic research program. Only the National Institutes of Health and National Science Foundation programs are larger. If ER's plant and capital equipment funding for its unique large science facility investment were included, Energy Research would be larger than the National Science Foundation. Over 18,000 scientists and engineers from almost 600 universities, companies and government laboratories performed research at ER's laboratories and many special user facilities in 1996. These facilities include large, expensive x-ray and gamma-ray "light" sources, research reactors, and high energy and nuclear physics particle accelerators located in 11 states. Our research at universities helps educate and nurture the next generation of scientists and engineers. These young people bring the creative enthusiasm of youth to tackle national problems.

Over the past 50 years, DOE has established an extensive national laboratory and university network of expertise in science and engineering. This network has supported the research of over 67 Nobel Prize winners. Today multidisciplinary research at these institutions produces knowledge, instruments, techniques, and materials that others can use for additional research or for technology development. Our human genome research, for example, originated from concerns about the genetic effects of energy-related nuclear radiation and chemical byproducts. Today, its discoveries enable medical researchers to develop new bio-technology for diagnosing and treating diseases such as cancer.

Consistent with the Department's Strategic Plan, ER set five goals. The goals sustain our longstanding traditions of emphasizing scientific excellence and working in partnership with other organizations dedicated to advancing energy and supporting science. Reaching these goals will help provide America with the range of energy and policy options it needs for future prosperity.

The goals are:

- Assure that ER's programs are of the highest quality and are highly productive; that they strengthen and diversify the Nation's scientific work force; and that they are widely known, valued, and trusted.
- Enable the United States to uphold and enhance its world leadership in science, mathematics, and engineering needed by all sectors of the Nation to enhance energy productivity and ensure reliable energy services while preserving human and environmental health and safety.
- Obtain major new insights into the nature of energy and matter to better understand our natural world.
- Provide the best and most advanced scientific research facilities and infrastructure to advance science, improve existing energy options and create new energy choices.
- Ensure that ER activities are protective of our workers, the public and the environment.



Strategy

ER's budget request of $2,525.0 million for FY 1998 is shown in Table 1 by major ER program. ER is seeking $672.2 million for its Basic Energy Sciences program, $376.7 million for its Biological and Environmental Research program, $675.0 million for its High Energy Physics program, $332.6 million for the Nuclear Physics program, $225.0 million for the Fusion Energy Sciences program, and $175.9 million for Computational and Technology Research. The request includes $40.3 million for the Multiprogram Energy Laboratories Facilities support program, $10.2 million for General Science Program Direction, $30.6 million for ER Energy Supply Program Direction, and $1.5 million for Energy Research Analyses. The request is offset by use of $15.0 million of unobligated SSC termination funds. Included in the above request is $178.1 million to fully fund FY 1998 fixed asset requirements identified in new separate accounts in FY 1998.The Office of Energy Research also oversees the $12.0 million Technical Information Management program.

In addition to the above, an advance appropriation of $394 million is proposed to fund the Large Hadron Collider (LHC). LHC funding was provided in FY 1996 ($6 million) and FY 1997 ($15 million). In addition to the FY 1998 request of $35 million, this advance appropriation of $394 million affirms the Administration's commitment to the U.S. Contribution to the LHC project and caps the level of the total DOE contribution to LHC component fabrication at $450 million.

ER's FY 1998 request includes a balanced set of investments that uphold the Office's leadership in fundamental research, scientific facilities, and building the nation's scientific and technical strength. To leverage these investments with limited resources, we are working with university, industrial, national laboratory and international research partners to multiply the effectiveness of our activities.

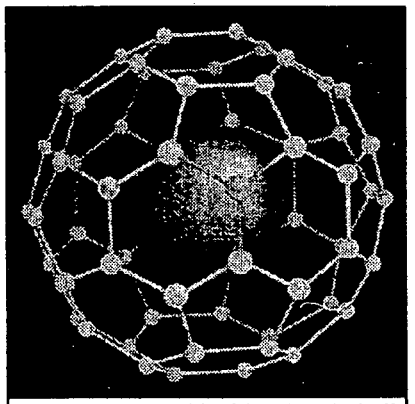
Strategies to support our goals reaffirm our traditional reliance on merit review with peer evaluation of investigator-initiated proposals as we seek new directions for our research programs.

The strategies are:

- *Assure excellence in research.* We emphasize initiation of proposals by investigators and select the best using peer review. Our various standing advisory committees help us use the Nation's science and technology communities to identify the most important research to support and the best way to do it. Our program managers measure research quality within technical areas or disciplines with scheduled periodic evaluations, including assessment by panels of technical experts. For excellence in the future, we reach out to improve the quality of and access to science, mathematics, and engineering education to replenish America's storehouse of scientific talent.

Top Quark Chasers-
Some of the 420 physicists and students behind Fermilab's D-Zero detector

- *Support science with a purpose.* To warrant Office of Energy Research support, a research project must be mission-relevant. That is, it must advance knowledge in key fields and disciplines, further pursuit of departmental missions, or enable timely response to national goals. Our programs also cover fields not covered by traditional disciplines that offer challenges for new knowledge and opportunities for fulfilling departmental missions and national goals.
- *Provide major scientific facilities.* To keep the United States at the forefront of the search for knowledge, ER supports large, sophisticated research facilities to help meet the Nation's science and technology goals. Specifically, we focus on providing the facilities most needed by the scientific community, which are too expensive for a single institution or group of institutions to build. We make the facilities available for the best research proposed by university, industrial, and government scientists as decided by peer review. Our strategy includes streamlined management of these facilities and investments in technology development. Timely repair and maintenance of their general purpose infrastructure advances the capabilities and reduces the costs of facilities.
- *Coordinate research on complex national problems important to DOE missions.* ER programs coordinate and fund multidisciplinary research at universities and the National Laboratories on complex national problems requiring a long investment horizon to find satisfactory solutions. The problems are found in areas such as fusion energy sciences, global climate change and the carbon cycle, including carbon dioxide sequestration, and advanced and environmentally conscious manufacturing. Additional areas include advanced materials and processing, medical applications of advanced imaging techniques, high performance computing and communications, and mapping and sequencing the human genome. The National Laboratories with their multidisciplinary teams are special resources for coordinating and performing this research.
- *Continuously improve the quality of our administrative processes.* We increase our effectiveness and productivity by improving program management practices and by using performance based contracts with our laboratories. Quality improvement includes leveraging resources through domestic and international partnerships. ER's programs seek out America's excellent scientists, employees, and contractors.
- *Advocate effectively the role and relevance of the research we support.* We are reaching out more than ever through presentations, newsletters, and the Internet to inform the public about the exciting results of the research we support.



An atom trapped inside a Buckyball

The Office's basic research portfolio has brought great success in advancing science, the Department's missions and the welfare of the Nation. In 1996, research supported by the Office of Energy Research shared the Nobel Prize in chemistry. The winners discovered a new carbon form (shaped like a soccer ball and called Buckministerfullerene or "Buckyballs") with potential for practical applications ranging from superconductivity to medical applications. Research from the 1996 field experiments of the Atmospheric Radiation Monitoring Project, showed that existing climate models underestimated the absorption of solar radiation in the atmosphere. Since absorption of radiation by clouds plays a key role in determining global climate, this research will help to improve current climate models. New atmospheric measurements will be initiated in 1997 in the arctic region near Point Barrow, Alaska. These measurements, to be taken in collaboration with the National Science Foundation, will be especially valuable as most scientists believe that global warming will show up first in arctic regions. The William R. Wiley Environmental Molecular Sciences Laboratory, a unique scientific user facility for molecular-level research in environmental and life sciences, was officially dedicated in FY 1997.

Energy Research DNA-clone resources played a key role in the hunt for a second gene, BRAC2, linked to breast cancer. Other genes located in 1996 include those for: Batten disease, a fatal, inherited disease of the nervous system that develops in childhood; and Fanconi's Anemia (Type A), a disease characterized by developmental abnormalities, bone marrow failure, and increased susceptibility to cancer. Using advanced medical imaging technology pioneered in ER, scientists identified a connection between smoking and the enzyme Monoamine Oxidase in the brain. This reveals a possible neurochemical link between smoking and the decreased risk of Parkinson's disease.

Energy Research FY 1998 Priorities

- **National Spallation Neutron Source**
- **Support Next Generation Internet**
- **Maintain Science Facilities Utilization**
- **Sustain High Energy Physics**
- **Pursue Fusion Research**
- **Targeted Research Investments**

A joint Energy Research-Energy Efficiency team developed a technique for producing long lengths of high-temperature superconducting tape (RABiTS) capable of carrying record current capacities in high magnetic fields. ER researchers learned how to significantly reduce large energy losses from fusion plasma in experiments consistent with theoretical predictions. We also initiated the Joint Center for Human Genome Research to pool the resources and capabilities of three DOE National Laboratories to both advance the technical requirements of the Human Genome program to the benefit of our other mission related research and technology needs.

Initial operations of the superconducting accelerator at the new Thomas Jefferson National Accelerator Facility have been successful, with data accumulation from several experiments. The upgraded and rededicated National Energy Research Scientific Computing Center will better serve the scientific computing needs of the Nation's researchers.

Major Changes

It is important to recognize that in preparing the FY 1998 request, the Administration has designated the Basic Energy Sciences, Biological and Environmental Research, High Energy Physics and Nuclear Physics programs as priority programs, consistent with the National Science Foundation and the National Institutes of Health.

In formulating the program this year we have as our highest priorities: pre-Title I design activities for a National Spallation Neutron Source, helping to advance the "next generation internet," sustaining progress in high energy physics and nuclear physics, transition to a fusion energy sciences program, optimizing use of ER's scientific and computational facilities, selective expansion of programs, and leveraging basic research through partnerships with DOE technology R&D programs. New asset acquisition accounts in the FY 1998 request include full funding for new and on-going construction projects.

In FY 1998, the High Energy Physics program increases support for university and other laboratory's activities and it increases U.S. participation in Europe's Large Hadron Collider project. Participation in the Large Hadron Collider project at CERN enables the U.S. to participate in new discoveries at the highest energy frontier. We request an advance appropriation of $394 million for the DOE contribution to the Large Hadron Collider to provide: $65 million in FY 1999; $70 million in FY 2000; $70 million in FY 2001; $70 million in FY 2002; $65 million in FY 2003; and $54 million in FY 2004.

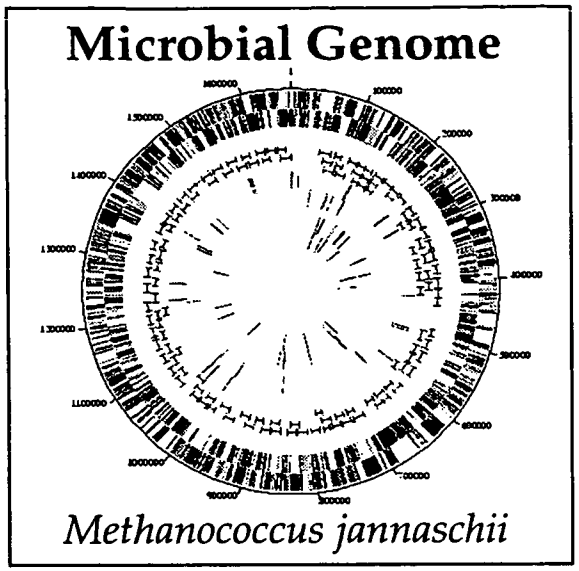
While construction activity in High Energy Physics decreases, Fermilab's Main Injector project remains on the approved funding profile. The Main Injector will provide a doubling of intensity for the fixed target program and a fivefold increase in luminosity. This will, among other things, let us take a closer look at the nature of the top quark. The Collider Detector Facility and D-Zero detector upgrades at Fermilab receive greater emphasis, as do activities to achieve maximal operation of the Tevatron. Our FY 1998 request includes funding for a third detector hall at Fermilab.

The Department has initiated a pilot program intended to evaluate opportunities to reduce the volume of newly generated waste and its associated management and disposal costs resulting from Departmental mission activities. Beginning in FY 1998, the Department will implement a Pilot Waste Management Re-engineering Program at a limited number of sites, including Fermilab and the Stanford Linear Accelerator Center in the High Energy Physics program, at which responsibility for the newly generated waste management programs will be transferred from the Office of Environmental Management to the generating program. Throughout the implementation of the FY 1998 pilot, the regulatory accountability will remain with the program that currently holds the regulatory permits. In addition, the Office of Environmental Management will be responsible for any unavoidable funding shortfalls due to underestimates for FY 1998 waste generation. The department expects that this re-engineered waste management structure will result in increased awareness on the waste generation organizations' part, thereby creating a financial incentive to minimize waste generation. Waste generating programs will be able to clearly track the true costs of their waste generation, and incorporate the associated costs within the formulation of the outyear budgets. To the extent that the programs minimize waste generation, the savings will be available to support increased mission activity. The impacts of this pilot arrangement will be carefully evaluated throughout FY 1998, and will provide the basis of the Administration's decision regarding the continuation and/or expansion of the effort in FY 1999 and beyond. The pilot Waste Management Re-engineering Program was initiated in response to several recommendations received from several Departmental stakeholders, including the National Academy of Sciences and the Environmental Management Advisory Board.

In FY 1998, our Basic Energy Sciences program will operate National user facilities effectively, including increased operating time at the High Flux Isotope Reactor and full operation of the Advanced Photon Source at Argonne National Laboratory. The program provides for pre-Title I design activities for a National Spallation Neutron Source at the Oak Ridge National Laboratory. Carried out by Oak Ridge and other national laboratories, this work will resolve important R&D and engineering design issues.

The program continues to support research for vehicles of the future, environmentally responsive technologies, and sustainable development. This research yields theories, models, materials and other knowledge needed to make lighter, more efficient automobiles and to lower costs and environmental impacts of energy production and use. Advances in theory and modeling of complex materials and phenomena will foster discovery of new materials for improved energy technologies. Design and fabrication of instrumentation for the Short Pulse Spallation Source, at LANSCE, will begin. Program research will further understanding of essential energy processes such as corrosion resistance, chemical reactions in combustion and processing, rock-fluid mechanics, and biological energy conversion. Research into complex phenomena at the atomic and molecular level promises better structural materials and understanding of adhesion in composite materials.

The Nuclear Physics program retains research in Medium Energy Nuclear Physics, Heavy Ion Nuclear Physics and Nuclear Theory at the FY 1997 levels. New astrophysics research begins at Oak Ridge National Laboratory's Radioactive Ion Beam facility and various universities. Support increases for the Relativistic Heavy Ion Collider, for additional experimental equipment and for operating heavy ion facilities. Operation of the Argonne National Laboratory's ATLAS increases with offsetting decreased operations at the Tandem/Alternating Gradient Synchrotron and fewer beam hours at other facilities.



For FY 1998, the Biological and Environmental Research program will give more emphasis to high-throughput DNA sequencing methods for the human genome program. Funds are provided to operate the recently completed Environmental Molecular Science Laboratory and Human Genome Laboratory. An increase in bioremediation research enhances support for the ten-year plan on bioremediation, including the Natural and Accelerated Bioremediation Research. Funds will also support research to better understand the archaea - a third form of life. An archaea specimen, the *Methanococcus Jannaschii* was fully sequenced by our Microbial Genome program in FY 1996. Fully 56% of its 1,738 genes are unlike anything seen before with possible implications for energy and pollution remediation. Our Atmospheric Radiation Monitoring program addresses the most pressing question on environmental processes bearing on the potential for global warming. FY 1998 includes an unmanned aerial vehicle flight mission to complement the current ground-based system. Increased nuclear medicine emphasis goes to innovative imaging methodologies for medical diagnosis and therapy. Support for the Computer Hardware, Advanced Mathematics and Model Physics program lessens with a decrease in climate and hydrology research. A decrease in atmospheric chemistry and carbon cycle research initiates elimination of ocean field research.

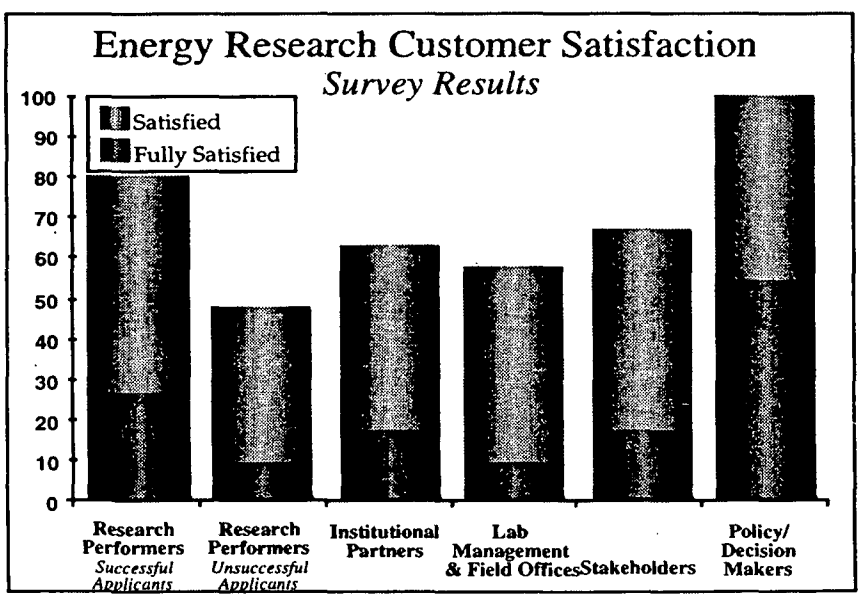
The national Fusion Energy Sciences program will preserve our capabilities to contribute to international efforts to develop fusion as an energy technology at a funding level comparable to FY 1997. It will do this by advancing plasma science; by developing fusion science, technology, and plasma containment innovation in the domestic program; and by remaining a partner in the international effort. The program further broadens the basic plasma science initiative that began in FY 1997. Support increases for theory directed toward alternate confinement concepts and for development of increased computational capability. Research on Inertial Fusion Energy and advanced materials continues at the FY 1997 level, while ITER Engineering Design Activities drop slightly below the FY 1997 level. Shutting down and mothballing the Tokamak Fusion Test Reactor in midyear permits increased scientific productivity at the two remaining major tokamaks, DIII-D and Alcator C-MOD. Activities accelerate to prepare for fabrication, assembly and installation of the National Spherical Tokamak Experiment at the Princeton Plasma Physics Laboratory.

The Computational and Technology Research program, through high performance computing and communications, continues to extend the availability and utility of our laboratories and user facilities. The "Next Generation Internet" interagency initiative is funded. New capabilities will enable scientists nationwide to work together on problems as easily as if they were at the same National Laboratory or facility. Program emphasis in FY 1998 supports these national "collaboratories" and advanced computational testing and simulation. We expect, for example, to conclude several large grand challenge computer modeling projects such as the numerical tokamak and ground water transport.

We continue to strengthen collaborations with the Office of Environmental Management and the Office of Energy Efficiency and Renewable Energy. In partnership with the Office of Environmental Management, for example, we perform fundamental research that addresses problems in environmental management, remediation, and restoration that are intractable without new, fundamental scientific information and technologies.

In partnership with the Office of Energy Efficiency, for example, we perform basic research in support of the Program for a New Generation of Vehicles. This research helps to bridge a gap between the Department's fundamental research and its other programs.

This year, an important emphasis of our global climate research is carbon sequestration. Our work in terrestrial and ocean research, carbon cycle assessments, geological storage, and separation sciences contribute understanding and innovative approaches to sequestration processes. Consistent with growing domestic and international concern surrounding increases in atmospheric levels of carbon dioxide, we will evaluate international research efforts and work closely with applied programs in Fossil Energy and Energy Efficiency and Renewable Energy to prepare DOE-wide programs that will improve the Nation's options and capability for analyzing the carbon cycle and enhancing carbon sequestration.



There continues to be downward pressure on our program direction budgets. Despite strong support of our programs by the Administration and the Congress, ER is planning on further staff reductions roughly equivalent to those of other programs in the department. We have completed a detailed activity-based analysis to identify the most time-consuming and costly functions that we perform and those activities that did not add value to our work products. A survey of our customers, including the scientists who perform research and use our facilities, indicated that 72 percent are satisfied or very satisfied with the services we provide. Discounting respondents who were unsuccessful applicants for funding, the number increases to 76 percent. As a result of the survey and the activity-based analysis, we have begun a number of process improvement and reengineering activities, including a major effort to improve how we collect, process, and disseminate information on our programs. These changes will eliminate any redundancies that may exist in staffing and processes. We currently have one of the best ratios of program dollars managed per Federal Staff member both within the Department and across the federal government. In addition Energy Research processes more grants, contracts and research proposals then any other DOE program. We firmly believe that further reductions would seriously inhibit our ability to respond in a timely and effective way and have serious adverse impacts on our ability to manage the very important research programs entrusted to us.

Performance Measures

ER managers routinely measure their programs' scientific performance within a context of evolving national needs, adjusting program direction and goals as necessary. They use a variety of methods to measure performance in the three critical areas of quality, relevance, and stewardship of national research resources, or more specifically: (1) quality of basic science as determined by expert advisory committees and peer reviews, recognition by the general scientific community that research is high quality and that facilities are world class, and sustained scientific advancement; (2) relevance to DOE science and technology missions and national needs is demonstrated by active partnerships within the

department and with other government agencies, industry, and academia; and (3) stewardship of national research resources that includes effectiveness and efficiency of construction and operation of research facilities as shown by ER's ability to achieve performance specifications, meet schedule and cost milestones, operate facilities reliably, and maintain and improve facilities at reasonable cost.

For management performance, ER will develop, in FY 1997, measures for evaluations in program direction including measures in program, project, procurement, financial, and human resources management. Future assessments of performance will be made in contract management and national laboratory stewardship. ER will evaluate national laboratories performance related to infrastructure management and intellectual core competencies in carrying out its stewardship responsibilities.

Closing

Through multidisciplinary research, our programs advance fundamental understanding of matter and energy and systems leading to efficient, diverse and reliable energy sources. The knowledge gained leads to improved health and environmental quality and to a more productive and competitive economy. Energy Research provides the United States with the finest and most advanced scientific research facilities and infrastructure. To get the most research out of every dollar appropriated, we work to ensure our programs are productive and the highest quality. It is in the interest of the Nation that these programs are sustained for the benefit of future generations.

Martha A. Krebs
Director
Office of Energy Research

OFFICE OF ENERGY RESEARCH
FY 1998 CONGRESSIONAL REQUEST TO CONGRESS
(B/A in thousands of dollars)
Table 1 Funding By Program
PAGE 1 OF 2

	FY 1996 Conf. Approp.	FY 1997 Conf. Approp.	FY 1998 Request W/O Upfront Funding	FY 1998 Request With Upfront Funding
ENERGY SUPPLY R&D - ENERGY RESEARCH				
Basic Energy Sciences	$774,333	$649,675	$661,240	$661,240
Computational and Technology Research	0	153,500	175,907	175,907
Fusion Energy Sciences	238,940	232,500	225,000	225,000
Biological and Environmental Research	410,956	389,075	376,710	376,710
Energy Research Analyses	3,337	2,000	1,500	1,500
Multiprogram Energy Labs-Facilities Support	34,044	21,260	0	0
Technology Transfer	16,672	0	0	0
ER Energy Supply R&D Program Direction	0	30,600	30,600	30,600
Advisory and Oversight	5,936	0	0	0
Policy and Management	2,116	0	0	0
University and Science Education	20,066	0	0	0
SBIR/STTR	66,763	0	0	0
General Reduction for Use of Prior Year Balances	-36,741	-21,053	0	0
Subtotal, Energy Supply R&D - Energy Research	$1,536,422	$1,457,557	$1,470,957	$1,470,957
ENERGY ASSET ACQUISITION - ENERGY RESEARCH				
Basic Energy Sciences	0	0	7,000	11,000
Multiprogram Energy Labs-Facilities Support	0	0	21,260	40,267
Total, Energy Research Fixed Assets	$0	$0	$28,260	$51,267
Total, Energy Supply R&D	$1,536,422	$1,457,557	$1,499,117	$1,522,124
GENERAL SCIENCE AND RESEARCH				
High Energy Physics	656,403	670,075	624,185	624,185
Nuclear Physics	299,946	315,925	256,525	256,525
General Science Program Direction	9,500	10,000	10,200	10,200
Subtotal, General Science and Research	$965,849	$996,000	$890,910	$890,910
SCIENCE ASSET ACQUISITION				
High Energy Physics	0	0	50,850	50,850
Nuclear Physics	0	0	59,400	76,020
Total, General Science Fixed Assets	$0	$0	$110,250	$126,870
Total, General Science	$965,849	$996,000	$1,001,160	$1,017,780
TOTAL, ENERGY RESEARCH	$2,502,271	$2,453,557	$2,500,277	$2,540,004

OFFICE OF ENERGY RESEARCH
FY 1998 CONGRESSIONAL REQUEST TO CONGRESS
(B/A in thousands of dollars)
Table 1 Funding By Program
PAGE 2 OF 2

TOTAL, ENERGY RESEARCH	$2,502,271	$2,453,557	$2,500,277	$2,540,004
Superconducting Super Collider	0	0	-15,000	-15,000
Other	-196	0	0	0
TOTAL, OFFICE OF ENERGY RESEARCH	$2,502,075	$2,453,557	$2,485,277	$2,525,004
OTHER ENERGY PROGRAMS				
Technical Information Program	$11,960	$12,000	$11,987	$11,987
General Reduction for Use of Prior Year Balances	-180	-163	0	0
TOTAL, TECHNICAL INFORMATION PROGRAM	$11,780	$11,837	$11,987	$11,987

OFFICE OF ENERGY RESEARCH
FY 1998 CONGRESSIONAL BUDGET REQUEST
(B/A in thousands of dollars)
Table 2 - Funding By Cross-Cutting Area

	FY 1996 Conf. Approp	FY 1997 Conf. Approp.	FY 1998 Cong. Request
Global Climate Change			
Biological and Environmental Research	112,752	112,333	110,126
Climate Change Action Plan	N/A	N/A	N/A
Partnership for A New Generation of Vehicles			
Basic Energy Sciences	5,000	5,000	5,000
Pollution Prevention			
High Energy Physics	271	582	418
Nuclear Physics	0	150	210
Biological and Environmental Research	822	258	198
Multiprogram Energy Laboratory Facilities Support	606	295	1,034
Indirect	173	115	130
Laboratory Technology Research	16,672	24,130	15,829

OFFICE OF ENERGY RESEARCH
FY 1998 CONGRESSIONAL BUDGET REQUEST
(FTEs)

Federal Staffing Summary

	FY 1996 Conf. Approp.	FY 1997 Conf. Approp.	FY 1998 Cong. Request
Energy Supply R&D Program Direction			
Field	48	42	3
Headquarters	222	202	199
Total, Energy Supply R&D	270	244	202
Fusion Energy Sciences Program Direction			
Field	19	14	12
Headquarters	51	48	37
Total, Fusion Energy Supply Program Direction	70	62	49
General Science Program Direction[1/]			
Field	33	33	33
Headquarters	59	57	57
Total, **General Science Program Direction**	92	90	90
Total Energy Research			
Field	100	89	48
Headquarters	332	307	293
Total, Energy Research	**432**	**396**	**341**
Technical Information Management			
Office of Scientific and Technical Infirmation	134	128	126

[1/] Excludes Superconducting Supercollider FTEs, which are funded from prior year appropriations.

OFFICE OF ENERGY RESEARCH
FY 1998 CONGRESSIONAL BUDGET REQUEST
(B/A in thousands of dollars)
Site Funding

Major Site Funding	FY 1996 Conf. Approp.	FY 1997 Conf. Approp.	FY 1998 Pres. Request
AMES LABORATORY			
Basic Energy Sciences	23,135	17,830	17,843
Biological and Environmental Research	676	569	596
Computational and Technology Research	0	2,034	1,942
University and Science Education	95	0	0
Technology Transfer	20	0	0
Total Laboratory	23,926	20,433	20,381
ARGONNE NATIONAL LABORATORY			
Basic Energy Sciences	159,079	137,098	143,088
Biological and Environmental Research	17,074	9,789	10,029
Computational and Technology Research	0	13,272	14,243
Energy Research Analyses	250	0	0
Fusion Energy	5,307	1,915	2,560
High Energy Physics	8,930	8,669	8,525
Multiprogram Energy Labs-Facilities Support	8,762	4,868	17,321
Nuclear Physics	15,771	16,107	16,720
University and Science Education	2,550	0	0
Technology Transfer	3,016	0	0
Total Laboratory	220,739	191,718	212,486

Major Site Funding	FY 1996 Conf. Approp.	FY 1997 Conf. Approp.	FY 1998 Pres. Request
BROOKHAVEN NATIONAL LABORATORY			
Basic Energy Sciences	83,623	74,229	79,281
Biological and Environmental Research	27,490	23,773	21,249
Computational and Technology Research	0	2,863	3,359
Fusion Energy	97	60	50
High Energy Physics	75,325	72,704	71,765
Multiprogram Energy Labs-Facilities Support	9,907	11,932	568
Nuclear Physics	100,001	104,380	123,155
University and Science Education	745	0	0
Technology Transfer	2,168	0	0
Total Laboratory	299,356	289,941	299,427
THOMAS JEFFERSON NATIONAL ACCELERATOR FACILITY			
Basic Energy Sciences	155	0	0
Computational and Technology Research	0	180	180
Fusion Energy	5	0	0
High Energy Physics	230	0	0
Nuclear Physics	67,375	67,955	67,350
University and Science Education	150	0	0
Total Laboratory	67,915	68,135	67,530

Major Site Funding	FY 1996 Conf. Approp.	FY 1997 Conf. Approp.	FY 1998 Pres. Request
FERMI NATIONAL ACCELERATOR LABORATORY			
Biological and Environmental Research	1,575	2,200	0
High Energy Physics	260,270	260,811	264,341
University and Science Education	355	0	0
Total Laboratory	262,200	263,011	264,341
IDAHO NATIONAL ENGINEERING LABORATORY			
Basic Energy Sciences	3,454	2,758	2,744
Biological and Environmental Research	2,646	2,280	2,091
Fusion Energy	2,494	2,360	2,360
Nuclear Physics	115	120	100
University and Science Education	120	0	0
Total Laboratory	8,829	7,518	7,295
LAWRENCE BERKELEY NATIONAL LABORATORY			
Basic Energy Sciences	112,235	61,564	62,323
Biological and Environmental Research	37,019	19,238	24,167
Computational and Technology Research	0	42,932	49,520
Fusion Energy	5,182	11,650	4,240
High Energy Physics	25,487	22,504	21,100
Multiprogram Energy Labs-Facilities Support	6,243	0	6,500
Nuclear Physics	24,610	23,670	23,590
University and Science Education	1,069	0	0
Energy Research Analyses	45	0	0
Technology Transfer	2,289	0	0
Total Laboratory	214,179	181,558	191,440

Major Site Funding	FY 1996 Conf. Approp.	FY 1997 Conf. Approp.	FY 1998 Pres. Request
LAWRENCE LIVERMORE NATIONAL LABORATORY			
Basic Energy Sciences	2,450	6,094	4,731
Biological and Environmental Research	20,905	14,712	21,793
Computational and Technology Research	0	665	660
Fusion Energy	17,094	9,272	8,910
High Energy Physics	1,836	380	388
Nuclear Physics	690	535	425
University and Science Education	677	0	0
Total Laboratory	43,652	31,658	36,907
LOS ALAMOS NATIONAL LABORATORY			
Basic Energy Sciences	35,005	19,894	23,886
Biological and Environmental Research	20,373	15,011	21,365
Computational and Technology Research	0	15,630	12,648
Fusion Energy	4,610	3,456	3,356
High Energy Physics	916	725	736
Nuclear Physics	12,514	10,713	10,680
Energy Research Analyses	50	0	0
University and Science Education	579	0	0
Total Laboratory	74,047	65,429	72,671

Major Site Funding	FY 1996 Conf. Approp.	FY 1997 Conf. Approp.	FY 1998 Pres. Request
OAK RIDGE NATIONAL LABORATORY			
Basic Energy Sciences	99,693	85,049	105,382
Biological and Environmental Research	22,758	19,549	19,123
Computational and Technology Research	0	12,340	9,069
Energy Research Analyses	525	0	0
Fusion Energy	19,415	16,244	16,740
High Energy Physics	342	335	342
Multiprogram Energy Labs-Facilities Support	4,134	2,500	15,878
Nuclear Physics	14,053	14,565	14,835
University and Science Education	795	0	0
Technology Transfer	2,734	0	0
Total Laboratory	164,449	150,582	181,369
PACIFIC NORTHWEST NATIONAL LABORATORY			
Basic Energy Sciences	13,063	12,304	12,377
Biological and Environmental Research	96,986	83,957	67,121
Computational and Technology Research	0	2,275	2,960
Energy Research Analyses	575	0	0
Fusion Energy	1,472	1,190	1,230
High Energy Physics	45	0	0
Multiprogram Energy Labs-Facilities Support	4,740	4,353	0
University and Science Education	410	0	0
Technology Transfer	3,376	0	0
Total Laboratory	120,667	104,079	83,688

Major Site Funding	FY 1996 Conf. Approp.	FY 1997 Conf. Approp.	FY 1998 Pres. Request
NATIONAL RENEWABLE ENERGY LABORATORY			
Basic Energy Sciences	5,431	4,270	4,301
Computational and Technology Research	0	150	147
University and Science Education	50	0	0
Total Laboratory	5,481	4,420	4,448
PRINCETON PLASMA PHYSICS LABORATORY			
Computational and Technology Research	82	0	0
Fusion Energy	60,057	55,873	47,623
University and Science Education	300	0	0
Total Laboratory	60,439	55,873	47,623
SANDIA NATIONAL LABORATORY			
Basic Energy Sciences	28,265	29,546	31,821
Biological and Environmental Research	1,924	1,850	1,750
Computational and Technology Research	0	4,428	3,569
Fusion Energy	5,675	5,245	5,555
University and Science Education	1,279	0	0
Total Laboratory	37,143	41,069	42,695
STANFORD LINEAR ACCELERATOR CENTER			
Basic Energy Sciences	22,083	20,537	21,007
Biological and Environmental Research	2,515	2,350	2,350
Fusion Energy	50	50	50
High Energy Physics	169,008	170,934	140,994
University and Science Education	80	0	0
Total Laboratory	193,736	193,871	164,401

Major Site Funding	FY 1996 Conf. Approp.	FY 1997 Conf. Approp.	FY 1998 Pres. Request
SAVANNAH RIVER LABORATORY			
Biological and Environmental Research	148	0	0
Fusion Energy	218	270	270
University and Science Education	5	0	0
Total Laboratory	371	270	270

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

PROGRAM MISSION

The Biological and Environmental Research (BER) program provides fundamental science to underpin the five business thrusts of the Department's strategic plan. Through its support of peer-reviewed research at national laboratories, universities, and private institutions, the program develops the knowledge needed to identify, understand, and anticipate the long-term health and environmental consequences of energy production, development, and use. The research is also designed to provide science in support of the Energy Policy Act of 1992.

The GOAL of the BER program is:

To develop the information, scientific "know-how," and technology for identification, characterization, prediction, and mitigation of adverse health and environmental consequences of energy production, development, and use.

The OBJECTIVES related to these goals are:

1. To CONTRIBUTE TO A HEALTHY CITIZENRY - Map the fine structure of the human genome by the year 2005 providing the basis for development of individual risk assessments; conduct fundamental research necessary for the development of advanced medical technologies and radiopharmaceuticals; and use the unique National Laboratory facilities to determine biological structure and function at the molecular and cellular level in support of this nation's biomedical sciences, pharmaceutical interests, and environmental activities.

2. To CONTRIBUTE TO CLEANUP OF THE ENVIRONMENT - Conduct fundamental research necessary for the development of advanced remediation tools and risk assessment methodologies for containing wastes and cleaning up DOE's contaminated sites, particularly in support of the mission of DOE's Environmental Management (EM) office.

3. To UNDERSTAND GLOBAL ENVIRONMENTAL CHANGE - Acquire the data and develop the understanding necessary to predict if and how energy production and use can affect the global and regional environment.

PROGRAM MISSION - BIOLOGICAL AND ENVIRONMENTAL RESEARCH - (Cont'd)

SCIENTIFIC FACILITIES UTILIZATION:

The Biological and Environmental Research request includes $39,818,000 to maintain support of the Department's scientific user facilities. Facilities used for structural biology research, such as beam lines at the synchrotron light sources and research reactors were included in the initiative for the first time in FY 1997. In FY 1998, the request includes operation of the new Environmental Molecular Sciences Laboratory where the research facilities will support environmental remediation. This funding will provide for the operation of the facilities, assuring access for scientists in universities, federal laboratories, and U.S. companies. It will also leverage both Federally and privately sponsored research consistent with the Administration's strategy for enhancing the U.S. National science investment.

PERFORMANCE MEASURES:

The quality and appropriateness of the Biological and Environmental Research (BER) program and individual research projects are judged by rigorous peer reviews conducted by internationally recognized scientific experts using criteria such as scientific merit, appropriateness of the proposed approach and qualifications of the principal investigator. Highest quality research is maintained by taking appropriate and, if needed, corrective management actions based on results of the reviews. A measure of the quality of the research is the sustained achievement in advancing knowledge as indicated by the publication of research results in refereed scientific journals, by invited participation at national and international conferences and workshops, and by awards received by DOE-supported BER researchers. Progress in the field is also routinely compared to the scientific priorities recommended by the Health and Environmental Research Advisory Committee (HERAC) and the National Science and Technology Council's (NSTC) committee on Environmental and Natural Resources and Fundamental Science.

An overarching and unique performance measure of the BER program is the diversity of program reviews conducted. This is particularly the case for BER program elements that are components of international research endeavors, e.g., the Human Genome Program and the Global Change Research Program. In addition to panel reviews that evaluate and select individual projects and programmatic reviews by the chartered BER advisory committee, these program elements are evaluated by interagency (and international) review bodies and by Boards and Committees of the National Academy of Sciences.

PROGRAM MISSION - BIOLOGICAL AND ENVIRONMENTAL RESEARCH - (Cont'd)

The BER program goes one step further in soliciting program reviews. Blue ribbon panels, not necessarily in the mainstream of the program's sciences, are charged with evaluating the quality of individual programs and with exploring ways of entraining new ideas and research performers from different scientific fields. This strategy is based on the conviction that the most important scientific advances of the new century will occur at the interfaces between scientific disciplines such as biology and information science. Groups like JASON and The Washington Advisory Group (TWAG), involving physicists, mathematicians, engineers, etc., are among the panels that have studied BER program elements such as the Atmospheric Radiation Measurement (ARM) program, climate change prediction, the Environmental Molecular Sciences Laboratory (EMSL), and the Human Genome Program.

Facility operations are also monitored by peer reviews and user feedback. These facilities are provided in a manner that meets user requirements (as indicated by achieving performance specifications while protecting the safety of the workers and the environment); operates facilities reliably and according to planned schedules; and maintains and improves facilities at reasonable costs.

Examples of BER program specific measures are:

1. Excellence in basic research: Program quality will be maintained at the highest level through merit reviews of research applications and facilities, and advice from the program advisory committee, and JASON; the program goal is that 90 percent of ongoing research will be rated as "very good" and "excellent" following merit review.

2. Access to Human Genome research results: Data on twenty five million subunits of finished human DNA sequence will be submitted to publicly accessible databases; increasing numbers of satisfied or very satisfied researchers will access the DNA sequence data.

3. Progress in Boron Neutron Capture Therapy (BNCT) Research: The effectiveness of BNCT will be determined through a second Food and Drug Administration sanctioned Phase I/II clinical trial which began in June 1996 with fifteen patients. This trial, which is expected to be completed in early FY 1998, will define optimum drug dosage and neutron exposure.

4. Environmental remediation developments: The development of advanced remediation tools (e.g., bioremediation) and risk assessment methodologies to contain hazardous waste and clean up DOE contaminated sites will be derived from fundamental research in environmental sciences, biology, molecular sciences, and mathematical modeling.

PROGRAM MISSION - BIOLOGICAL AND ENVIRONMENTAL RESEARCH - (Cont'd)

5. Atmospheric Radiation Measurement (ARM) accomplishments: Two intensive operations periods will be conducted at the ARM Southern Great Plains Site; two additional atmospheric radiation and cloud stations will become operational; and a next-generation climate model will be developed.

6. Environmental Molecular Sciences Laboratory (EMSL) collaboration products: Increase the number of EMSL products from collaborations (e.g., publications, patents, databases, software releases, technical reports, instruments developed, etc.).

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- Critical information has been acquired regarding the molecular nature of the human genome and genomes of other organisms, and explorations are continuing on the basic chemical structures of important biological molecules as they relate to the functions of living cells. These continued advances are central to understanding health effects and human disease-susceptibility at both the population and individual levels and for applications of biotechnology to the Department's missions. Increased emphasis will be placed on large-scale sequencing of select chromosomes.

- Significant progress has been made to understand the complex relationships between genes, the proteins they encode, and the biological functions of these proteins in the context of the whole organism.

- The Human Genome program will place increased emphasis on high-throughput sequencing of DNA to meet the joint DOE/NIH program goal of sequencing the entire Human Genome by FY 2005.

- New strategies for cleanup, including the use of biotechnology (e.g., microbes that break down contaminants), are being developed for stubborn remediation problems.

- Advanced technologies are being developed from resources and tools produced in the human genome program, to determine and mitigate the potential health effects from energy activities and cleanup operations. Emphasis is placed on the risks to human health from exposures to low levels of radiation and chemicals, both at home (e.g., radon) and at the DOE workplace (e.g., waste site cleanup).

- Significant improvements are being made in the predictive tools needed to quantify human-induced and natural global environmental changes, including those from energy production and use. Emphasis remains on the role of clouds in climate and on developing improved climate models using the Nation's most advanced computers.

PROGRAM MISSION - BIOLOGICAL AND ENVIRONMENTAL RESEARCH - (Cont'd)

- Ocean sciences field research will be completed, delivering new information on the role of the coastal and open ocean in the global carbon cycle.

- New nuclear medicine technologies and new radiopharmaceuticals incorporating radioisotopes commonly used for nuclear medicine into novel chemical structure for improved medical diagnosis and therapy are being developed, contributing to improved health care delivery while reducing costs by achieving early diagnosis and treatment. Increased emphasis will be placed on improved methodologies for imaging anatomical structures and physiological functions. The long-standing subprogram of research into new radioisotopes for nuclear medicine has become mature and of lower program priority, and is being phased out.

- The program has developed new measurement technologies (e.g., chemical and biological sensors) in the Medical Applications and Measurement Science subprogram to enhance research carried out in a broad range of BER projects. Examples include resonance ionization spectroscopy for environmental dating and flow cytometry for chromosome and cell separations.

BIOLOGICAL AND ENVIRONMENTAL RESEARCH
PROGRAM FUNDING PROFILE
(Dollars in thousands)

Subprogram	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Life Sciences	$145,195	$148,721	$0	$148,721	$157,037
Environmental Processes	112,752	112,333	0	112,333	110,126
Environmental Remediation	24,782	34,615	0	34,615	66,435
Medical Applications and Measurement Science	58,859	57,293	0	57,293	43,112
Program Direction	6,748	0	0	0	0
Subtotal	348,336	352,962	0	352,962	376,710
Construction	62,620	36,113	0	36,113	0
Subtotal, Biological and Environmental Research	410,956	389,075	0	389,075	376,710
Adjustment	-11,381 a/	-6,702 a/	0	-6,702 a/	0
TOTAL, BER	$399,575 b/	$382,373	$0	$382,373	$376,710

a/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

b/ Excludes $6,072,000 which was transferred to the SBIR program and $459,000 which was transferred to the STTR program.

Public Law Authorization:

Pub. Law 94-91, DOE Organization Act

BIOLOGICAL AND ENVIRONMENTAL RESEARCH
(Dollars in thousands)
PROGRAM FUNDING BY SITE

Field Offices/Sites	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Albuquerque Operations Office					
Los Alamos National Laboratory	$20,373	$15,011	$0	$15,011	$21,365
Sandia National Laboratory	1,924	1,850	0	1,850	1,750
Chicago Operations Office					
Ames Laboratory	676	569	0	569	596
Argonne National Laboratory (East)	17,074	9,789	0	9,789	10,029
Brookhaven National Laboratory	27,490	23,773	0	23,773	21,249
Environmental Measurements Laboratory	4,470	0	0	0	0
Fermi National Accelerator Laboratory	1,575	2,200	0	2,200	0
Idaho Operations Office					
Idaho National Engineering Laboratory	2,646	2,280	0	2,280	2,091
Oakland Operations Office					
Lawrence Berkeley National Laboratory	37,019	19,238	0	19,238	24,167
Lawrence Livermore National Laboratory	20,905	14,712	0	14,712	21,793
Stanford Linear Accelerator Facility (SSRL)	2,515	2,350	0	2,350	2,350
Oak Ridge Operations Office					
Oak Ridge Institute for Science & Education	4,424	2,682	0	2,682	1,862
Oak Ridge National Laboratory	22,758	19,549	0	19,549	19,123
Richland Operations Office					
Pacific Northwest National Laboratory	96,986	83,957	0	83,957	67,121
All Other Sites a/	150,121	191,115	0	191,115	183,214
Subtotal	410,956	389,075	0	389,075	376,710
Adjustment	-11,381 b/	-6,702 b/	0	-6,702 b/	0
TOTAL	$399,575 c/	$382,373	$0	$382,373	$376,710

a/ Funding provided to universitites, industry, other Federal agencies and other miscellaneous contractors.

b/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total reduction is applied at the appropriation level.

c/ Excludes $6,072,000 which was transferred to the SBIR program and $459,000 which was transferred to the STTR program.

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

LIFE SCIENCES

I. Mission Supporting Goals and Objectives:

Research is focused on utilizing unique DOE resources and facilities to develop fundamental biological information and advanced technologies for understanding and mitigating the potential health effects of energy development, energy use, and waste cleanup. Research is conducted in five areas: structural biology, cellular biology, molecular biology, human genome, and health effects. The research:

- Integrates information and technologies from genome, structural biology, and molecular biology research with human health research to understand the complex relationships between genes, the proteins they encode, and the biological functions of these proteins in the context of the whole organism.

- Develops new biotechnologies, including those derived from microbial genome research, for bioremediation applications, and for the mitigation of potential health effects resulting from energy development, energy use, and waste cleanup.

- Supports DOE research at national user facilities for scientists to determine the molecular structure of enzymes, antibodies, and other important biological molecules. Computational biology research combines computer science, structural biology, and genome research to predict the functions of biological molecules.

- Develops and applies new technologies and resources to map and determine the sequence of the subunits of DNA found in a typical human cell, for analyzing and interpreting DNA sequence data, and for studying the ethical, legal, and social implications (ELSI) of information and data resulting from the genome program, especially issues of privacy, intellectual property, and education. Program emphasis is on dramatically increasing the rate at which human DNA is sequenced and entered into public databases.

- Develops new molecular-based tools for health surveillance, biological dosimetry, and individual susceptibility determination to understand and characterize the risks to human health from exposures to low levels of radiation and chemicals both at home and at work. An emphasis is placed on research that utilizes the unique resources and tools developed in the Department's human genome, structural biology, and cellular and molecular biology programs.

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Structural Biology	$28,016	$27,661	$28,178	$ +517	+1.9%
Molecular and Cellular Biology	20,442	19,709	20,129	+420	+2.1%
Human Genome	73,912	77,875	85,081	+7,206	+9.3%
Health Effects	22,825	19,979	20,026	+47	+0.3%
SBIR/STTR	0	3,497	3,623	+126	+3.6%
Total, Life Sciences	$145,195	$148,721	$157,037	$+ 8,316	+5.6%

III. Performance Summary - Accomplishments:

	FY 1996	FY 1997	FY 1998
Life Sciences			
-Structural biology supports research at national user facilities to determine the molecular structure of important biological molecules to assist in rational drug design, improved biomaterials, and efficient removal of environmental contaminants. The program performs computational biology research aimed at enhancing our understanding of the structure-function relationship of biological macromolecules. Capital equipment funds are provided for the continuation of instrumentation for the neutron beam facility at Los Alamos and to purchase new generation detectors and related instrumentation for existing beamlines at the Department's synchrotrons.	$28,016	$27,661	$28,178
-Molecular biology research develops information and resources to address Departmental biotechnology needs including applications in energy development, energy use, and waste cleanup. Program efforts include determining the sequence and evolutionary relationships of industrially important microbes, determining the relationship between protein structure	13,279	12,278	12,436

III. Performance Summary - Accomplishments:	FY 1996	FY 1997	FY 1998
and function, and developing approaches to modify the structure of proteins to improve their function. Capital equipment funds provide for structural molecular biology beamline instrumentation.			
-Cellular biology research develops information and resources that exploit and integrate developments in the Department's genome, structural biology, and health effects programs. Program efforts include characterization of factors affecting gene expression, determination of the relationship between the expression of large numbers of genes in cells or tissues, development and use of animal models to understand specific human diseases and to determine the function of known or unknown human genes, and development of methods capable of efficiently determining the function of very large numbers of genes. Capital equipment funds support cellular biology research providing upgrades of flow cytometers, and microscope stage and control equipment.	7,163	7,431	7,691
-Genome research develops and uses resources and technologies for high-throughput human DNA sequencing, mapping and analysis, and studies genome-associated ethical, legal, and social issues. Program emphasis is on high-throughput sequencing, i.e., dramatically increasing the rate at which human DNA is efficiently, accurately, and cost-effectively sequenced and entered into public databases. The Program goal is to sequence the entire human genome which includes 3 billion base sequences, by the year 2005. DOE plans to accomplish 40% of this effort with the balance to be completed by NIH. Other efforts include physical mapping of the human genome, development of a set of analyses that reveal the biological informational content of the sequence data produced, more rapid entry of DNA sequence into public data bases, development of user-	73,912	77,875	85,081

III. Performance Summary - Accomplishments

friendly interoperable databases for DNA map and sequence data, development and distribution of educational programs on genome research and associated societal issues, and support of judges workshops on the use of genetic evidence. Capital equipment funding provides instrumentation for sequencing and computer hardware to support the human genome data bases. A table follows displaying both DOE and NIH genome funding.

BIOLOGICAL AND ENVIRONMENTAL RESEARCH
LIFE SCIENCES

U.S. HUMAN GENOME PROJECT FUNDING
(Dollars in millions)

	Prior Years	FY 1996	FY 1997	FY 1998
DOE Total Funding (includes construction)	$378.4	$79.6	$78.9	$85.1
NIH Funding	1,044.4	169.3	189.6	205.2
Total U.S. Funding	$1,422.8	$248.9	$268.5	$290.3

III. Performance Summary - Accomplishments	FY 1996	FY 1997	FY 1998
-Health effects research develops and uses information and tools for health surveillance and biodosimetry. Program efforts include completion of lifespan animal carcinogenesis studies to improve estimates of human health risks from radiation exposure, identification and characterization of DNA repair genes, identification of polymorphisms in genes associated with DNA repair that may increase health risk, development of improved techniques to detect small changes in the number of individual chromosomes or genes associated with the development of disease, and integration of rapid DNA screening technologies with information on genes that may increase health risk from radiation or chemicals. Capital equipment funds provide items such as cage washers, centrifuges, themocyclers, laminar flow hoods, phoshoimagers, and computer hardware for confocal microscopes in support of health effects research.	22,825	19,979	20,026
SBIR/STTR -In FY 1996 $2,649,000 and $184,000 were transferred to the SBIR and STTR programs respectively. The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only since Part D, Section 110 of P.L. 104-208, making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.	0	3,497	3,623
TOTAL Life Sciences	$145,195	$148,721	$157,037

EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:

-Increase in Human Genome funding will allow: an increase in the annual rate of finished DNA base sequences of 10 million bases per year (Mb) in FY 1998, to yield a total output of approximately 40Mb in FY 1998; and development of a set of analyses that will reveal the biological content of the sequence data being produced.	$+7,206,000
-Slight increase in funding for Structural Biology and Molecular and Cellular Biology programs.	+937,000
-Slight increase in funding for the Health Effects program.	+47,000
-SBIR/STTR - Change in SBIR ($+324,000) due to increase in operating budget and no STTR funding in FY 1998 ($-198,000).	+126,000
Total Funding Change, Life Sciences	$+8,316,000

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

ENVIRONMENTAL PROCESSES

I. Mission Supporting Goals and Objectives:

Research is focused on understanding the basic chemical, physical, and biological processes of the Earth's atmosphere, land, and oceans and how these processes may be affected by energy production and use, primarily the emission of carbon dioxide from fossil fuel combustion. A major part of the research is designed to provide the data that will enable an objective assessment of the potential for, and consequences of, global warming. The program is comprehensive with an emphasis on understanding the radiation balance from the surface of the Earth to the top of the atmosphere (including the role of clouds) and on enhancing the quantitative models necessary to predict possible climate change at the global and regional scales. There are four contributing areas to this research program: Climate and Hydrology, Atmospheric Chemistry and Carbon Cycle, Ecological Processes, and Human Interactions. The National Institute for Global and Environmental Change (NIGEC) is included within these four areas. The Environmental Processes subprogram is DOE's contribution to the U.S. Global Change Research Program that was codified by Congress in the Global Change Research Act of 1990.

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Climate and Hydrology	$64,475	$63,697	$62,356	$-1,341	-2.1%
Atmospheric Chemistry and Carbon Cycle	25,569	26,020	23,993	-2,027	-7.8%
Ecological Processes	13,195	10,991	12,029	+1,038	+9.4%
Human Interactions	9,513	8,951	9,172	+221	+2.5%
SBIR/STTR	0	2,674	2,576	-98	-3.1%
Total, Environmental Processes	$112,752	$112,333	$110,126	$-2,207	-2.3%

III. Performance Summary - Accomplishments	FY 1996	FY 1997	FY 1998
Climate and Hydrology			
-Climate models on massively-parallel super-computers are used to simulate climate change, predict climate, and evaluate model uncertainties due to changes in atmospheric concentrations of greenhouse gases and modeling activities on decade-to-century timescales. Climate models (General Circulation Models) are being improved based on increasing understanding of the physical phenomena that define cloud and radiation processes, including those based on data acquired through the Atmospheric Radiation Measurement Program. Continued intercomparison of climate models results in the inclusion of new data and the refinement of the models. Activities in these areas include research performed through the National Institute of Global Environmental Change (NIGEC).	$21,556	$21,554	$20,307
-Under the Atmospheric Radiation Measurement (ARM) Program and the ARM Unmanned Aerial Vehicle (UAV) Program, research aimed at solving the role of clouds in climate change continues to provide new data to the scientific community. An effort to explore a potentially critical difference between the results of extensive data analysis and model calculations of short wave absorption prompted a data gathering mission which involved the ARM Southern Great Plains Site, flights by three aircraft, and extensive temporary ground instrumentation to complement existing instrumentation at the site. Data from this effort is still being analyzed. The ARM Program is scheduled to complete the installation of instrumentation at two additional major sites in regions which are climatologically significant to the cloud-radiation aspects of climate change--they are in the Tropical Western Pacific (TWP) and on the North Slope of Alaska (NSA). Capital equipment funding will be	42,919	42,143	42,049

III. Performance Summary - Accomplishments	FY 1996	FY 1997	FY 1998
used to support the development and instrumentation of the third ARM site on the North Slope of Alaska, to develop and build the second Atmospheric Radiation and Cloud Station (ARCS) for the ARM site in the Tropical Western Pacific, and to maintain instrumentation at the Southern Great Plains (Oklahoma-Kansas) site at the state-of-the-art level needed to achieve the mission of the Atmospheric Radiation Measurement (ARM) program. The first of the ground facilities in the TWP has been installed. The NASA effort will field a facility in 1998, in concert with the National Science Foundation's Solar Heat Budget of the Arctic Ocean (SHEBA).			
Atmospheric Chemistry and Carbon Cycle			
-Research provides atmospheric chemistry data necessary to understand pollutant transport and effects of tropospheric ozone. Initiate and implement prototypical study of air quality in megacities. Participate in the North American Research Strategy for Tropospheric Ozone (NARSTO) Program. Complete measurements of ocean carbon in the Indian and North Atlantic Oceans as part of the global survey to understand the role of oceans in the uptake of atmospheric carbon dioxide. Complete field experiments at land-ocean interface. Implement research in environmental marine biotechnology that builds upon expertise in marine sciences and modern biological sciences. Provide improved estimates of atmospheric carbon dioxide changes that result from fossil fuel combustion. Continue to model terrestrial carbon processes, and coupled with atmosphere-ocean modeling, estimate rate and timing of atmospheric carbon dioxide exchange. Implement carbon dioxide flux measurement network. Activities in these areas include research performed through the National Institute of Global Environmental Change	25,569	26,020	23,993

III. Performance Summary - Accomplishments	FY 1996	FY 1997	FY 1998
(NIGEC). Capital equipment funds support field instruments such as those used to measure carbon dioxide fluxes and ozone precursors.			
Ecological Processes			
-Continue experiments to quantify forest ecosystem responses to elevated carbon dioxide and climate variation. Improve understanding of the terrestrial biosphere's role in the uptake of carbon dioxide. Increase activities focused on developing an understanding of the interactions and feedback effects between the atmosphere and ecological systems. Quantify responses of forest and arid land ecosystems to alterations in precipitation. Complete regional analysis to identify ecological systems most sensitive to climatic variation and change to provide improved assessments of consequences of climate change. Activities in these areas include research performed through the National Institute of Global Environmental Change (NIGEC). Capital equipment funds are used to purchase field instruments such as those used to measure plant responses to changes in soil moisture and atmospheric composition and to replace worn out laboratory instruments, such as autoclaves, used to sterilize materials for soil microbiology experiments.	13,195	10,991	12,029
Human Interactions			
-Integrated Assessment framework will be developed, tested, and used to identify priority research needs. Risk assessment research develops new ways to identify economically efficient, environmentally sound solutions and technologies. Under the Information Program, massive amounts of data from a wide range of research programs in environmental	9,513	8,951	9,172

III. Performance Summary - Accomplishments	FY 1996	FY 1997	FY 1998
processes will be stored, evaluated, and shared with a broad range of investigators in all related fields. The success of the global change graduate and postdoctoral fellowship program will be evaluated with respect to training new scientists with cross-disciplinary skills. A new program that meets the continuing needs of developing research manpower in the disciplines that address uncertainties in environmental processes will be initiated and implemented, as appropriate. There will be continued support for the inclusion of minority institutions in research-oriented programs. Research performed through the National Institute of Global Environmental Change (NIGEC) includes activities in these areas.			
SBIR/STTR	0	2,674	2,576
-In FY 1996 $1,526,000 and $123,000 were transferred to the SBIR and STTR programs respectively. The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only since Part D, Section 110 of P.L. 104-208, making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.			
TOTAL Environmental Processes	$112,752	$112,333	$110,126

BIOLOGICAL AND ENVIRONMENTAL RESEARCH
ENVIRONMENTAL PROCESSES

EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:

Climate and Hydrology	
-A decrease of $2,035,000 in ARM funding reflects the reduction in equipment funding resulting from the completion of equipment installation at the Tropical Western Pacific Site. An increase of $1,941,000 in UAV research to transition the research from joint Strategic Environmental Research and Development Program (SERDP)/DOE funding allows one UAV flight mission and scientific analysis of data. A decrease of $1,204,000 reflects reduced support for the Computer Hardware, Advanced Mathematics and Model Physics (CHAMMP) program and other modeling efforts. A decrease of $43,000 allows the modeling program to continue at the FY 1997 level of effort.	$-1,341,000
Atmospheric Chemistry and Carbon Cycle	$-2,027,000
-The $2,027,000 decrease reflects reduced activities within the Atmospheric Sciences element following the completion of field experiments and measurements and also reflects the transition of ocean research programs from expensive ocean-based experiments to laboratory-based studies in marine biotechnology.	
Ecological Processes	
-Increase supports new experimental studies of effects of climate and atmospheric changes on ecological systems and processes and continues ongoing long-term effect studies.	$+1,038,000
Human Interactions	
-Continuation of activities at approximately the FY 1997 level.	$+221,000
SBIR/STTR	
-Change due to no STTR funding in FY 1998 ($-152,000) and an increase in SBIR ($+54,000) due to increased operating funding.	$-98,000
Total Funding Change, Environmental Processes	$-2,207,000

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

ENVIRONMENTAL REMEDIATION

I. Mission Supporting Goals and Objectives:

The research is primarily focused on gaining a better understanding of the fundamental physical, chemical, geological, and biological processes that must be marshaled for the development and advancement of new, effective, and efficient processes for the remediation and restoration of the Nation's nuclear weapons production sites. Priorities of this research include bioremediation, operation of the Environmental Molecular Sciences Laboratory (EMSL), and the fundamental research in support of the Department's cleanup and environmental missions. Bioremediation activities are centered on a new basic research program, the Natural and Accelerated Bioremediation Research (NABIR) program, focused on determining the conditions under which bioremediation will be a reliable, efficient, and cost-effective technique. This subprogram also includes basic research in support of pollution prevention and sustainable technology development. Bioremediation research develops the scientific information needed to develop and apply efficient, cost-effective bioremediation methods for remediating and restoring contaminated environments. Clean-up research is a research effort to develop information on physical, chemical, and biological processes required for developing advanced, cost-effective technologies and strategies to remediate contaminated environments. Facility operations supports the operation of the new EMSL user facility for basic research that will underpin safe and cost-effective environmental remediation methods and technologies.

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Bioremediation Research	$17,746	$21,204	$28,073	$ +6,869	+32.4%
Clean-Up Research	6,476	7,794	7,758	-36	-0.5%
Facility Operations	560	4,897	29,143	+24,246	+495.1%
SBIR/STTR	0	720	1,461	+741	+102.9%
Total, Environmental Remediation	$24,782	$34,615	$66,435	$+31,820	+ 91.9%

III. Performance Summary - Accomplishments	FY 1996	FY 1997	FY 1998
Bioremediation Research			
-Conduct research activities identified in the 10-year plan on bioremediation, the Natural and Accelerated Bioremediation Research (NABIR) program. Identify and establish the first NABIR field research center. Begin the long-term research, including aspects of the microbial genome program, necessary to identify key microbial, biotransformation, and biogeochemical processes to enhance the utility of bioremediation and develop strategies to represent these processes in predictive models.	$13,133	$15,192	$22,093
-General Plant Projects (GPP) funding is for minor new construction, other capital alterations and additions, and for buildings and utility systems. Funding of this type is essential for maintaining the productivity and usefulness of Department-owned facilities and in meeting its requirement for safe and reliable facilities operation. This subprogram includes landlord GPP funding for Pacific Northwest National Laboratory (PNNL) and for Oak Ridge Institute for Science and Education (ORISE).	3,488	4,837	4,811
-General Purpose Equipment (GPE) funding for general purpose equipment for PNNL and ORISE.	1,125	1,175	1,169

III. Performance Summary - Accomplishments	FY 1996	FY 1997	FY 1998
Clean-Up Research			
-Link long-term research on the physical, chemical, and geological studies of contaminant transport with related activities in the Office of Science and Technology within the Office of Environmental Management. Acquire data at the Environmental Molecular Sciences Laboratory and implement results in development of new understandings and technologies necessary to advance environmental remediation. Develop assessment and modeling tools useful for developing pollution prevention technologies.	6,476	7,794	7,758
Facility Operations: Environmental Molecular Science Laboratory (EMSL)			
-EMSL becomes fully operational as a national user facility in FY 1998. Operating funds provide essential maintenance of instruments and associated support facilities at the Laboratory, and technical and ES&H support needed to ensure access to and application of EMSL capabilities by the user community. Includes capital equipment funding to support instrument modifications needed by collaborators and external users of the facility and to maintain the spectroscopic and computer equipment at state-of-the-art.	560	4,897	29,143
SBIR/STTR Funding -In FY 1996 $744,000 and $66,000 were transferred to the SBIR and STTR programs respectively. The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only since Part D, Section 110 of P.L. 104-208, making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.	0	720	1,461
TOTAL Environmental Remediation	$24,782	$34,615	$66,435

BIOLOGICAL AND ENVIRONMENTAL RESEARCH
ENVIRONMENTAL REMEDIATION

EXPLANATION OF FUNDING CHANGES FROM FY 1996 TO FY 1997:

-Increase of funding in the NABIR program allows the initiation of the first field research center and the development of a strong research program in all seven scientific elements, enabling the integrated thrust of research development.	$+6,901,000
-GPP and GPE funding will continue at approximately the FY 1997 level.	-32,000
-Continuation of clean-up research at FY 1997 level.	-36,000
-Increase in funding supports first full year of EMSL operations.	+24,246,000
-SBIR/STTR Change in SBIR funding ($+784,000) due to increase in operating budget for Environmental Remediation. No funding for STTR in FY 1998 ($-43,000).	+741,000
Total Funding Change, Environmental Remediation	$+31,820,000

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

MEDICAL APPLICATIONS AND MEASUREMENT SCIENCE

I. Mission Supporting Goals and Objectives:

The medical applications subprogram supports research to develop beneficial applications of nuclear and other energy-related technologies for medical diagnosis and treatment. The research develops applications of radiotracer agents for medical research using recent advances in instrumentation as well as in computational, molecular, and structural biology. A major emphasis is placed on non-invasive diagnostic tools, including imaging technologies such as positron emission tomography. The research in this activity is conducted in six specific areas: Radioisotope Development, Radiopharmaceuticals, Instrumentation, Clinical Feasibility, Boron Neutron Capture Therapy (BNCT), and Molecular Nuclear Medicine.

The measurement science subprogram focuses on research and development of new measurement technologies to meet the needs of environmental and life sciences research of the Biological and Environmental Research program and other departmental customers. Emphasis is placed on using the advanced technologies developed in the Department's National Laboratories for environmental and biomedical research. Dosimetry research is devoted to providing fundamental understanding of interactions of radiation with matter needed to improve BNCT and other programs in medical applications and the life sciences.

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Medical Applications	$50,941	$48,723	$36,196	$-12,527	-25.7%
Measurement Science	7,918	7,041	5,858	-1,183	-16.8%
SBIR/STTR	0	1,529	1,058	-471	-30.8%
Total, Medical Applications & Measurement Science	$58,859	$57,293	$43,112	$-14,181	-24.8%

III. Performance Summary - Accomplishments	FY 1996	FY 1997	FY 1998
Medical Applications			
-Complete Phase I/Phase II human clinical trials of boron neutron capture therapy (BNCT) at Brookhaven National Laboratory, Massachusetts Institute of Technology and Ohio State University and follow up successful trials with additional clinical trials at higher drug and radiation dosages. Initiate collaboration with the National Cancer Institute to compare BNCT with conventional modes of therapy; complete research in dosimetry for BNCT. Capital equipment funds are provided for instrumentation needed to upgrade beamlines used for early clinical trials at BNCT.	$10,198	$10,161	$10,733
-Develop new approaches to radiopharmaceutical design and synthesis using genome sequencing information, combinatorial chemistry and computational modeling concepts. Develop new diagnostic probes for detection of cancer using advanced molecular biology techniques. Initiate research into biochemical control networks to identify targets for improved molecular nuclear medicine diagnosis and therapy approaches.	16,807	17,091	17,806
-The installation of a high field magnetic resonance imaging (MRI) system at the Brookhaven Imaging Center will allow integration of MRI with Positron Emission Tomography to produce multimodal systems for studies of human brain function in normal and diseased states. Develop new applications of imaging and laser technology and determine their feasibility for medical practice. Capital equipment funds are provided in support of research into new imaging techniques in nuclear medicine and for instrumentation needed for development of new detectors for medical isotopes.	5,799	5,747	6,208

III. Performance Summary - Accomplishments	FY 1996	FY 1997	FY 1998
-Research into new radioisotopes for nuclear medicine applications has matured and become a lower program priority, and is being phased out, resulting in a reduced budget in FY 1998. The requested funds will allow for completion of existing projects and termination costs as needed. Capital equipment funds supporting radioisotope research are used to purchase instrumentation such as radiation detectors.	3,033	3,039	1,449
-Funding for Oregon Health Sciences University and Biomedical Research Foundation of Northwest Louisiana, as included in Congressional direction for FY 1996. Funding for Indiana School of Medicine and Oregon Health Sciences University, as included in Congressional direction for FY 1997. Funding for these projects is completed in FY 1997.	15,104	12,685	0
Measurement Science			
-Complete research on new biosensors capable of making measurements in single cells; continue development of laser instrumentation for environmental applications. Capital equipment funds are provided for components needed for research into new instrumentation for environmental and life sciences applications.	7,918	5,541	5,858
-Facility modifications and improvements are necessary to ensure continued safe operation and reliability of accelerators, reactors, and other existing BER-related facilities. The FY 1997 funds will be used to upgrade laboratory facilities to current safety standards; to replace obsolete laboratory components such as fume hoods,	----	1,500	----

III. Performance Summary - Accomplishments	FY 1996	FY 1997	FY 1998
beamline optics, radioisotope hot cells and biological cold rooms; to provide proper waste treatment and storage equipment for materials that pose toxic, radioactive, or biological hazards; and to replace electrical, optical, and mechanical components of such systems where newer models provide for improved facility operation.			
SBIR/STTR Funding -In FY 1996 $1,153,000 and $86,000 were transferred to the SBIR and STTR programs respectively. The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only since Part D, Section 110 of P.L. 104-208, making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.	0	1,529	1,058
TOTAL Medical Applications and Measurement Science	$58,859	$57,293	$43,112

EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:

-The radioisotope development program is being phased out.	$-1,590,000
-Continuation of activities in BNCT at approximately the FY 1997 level with additional funding for equipment.	+572,000
-Decrease in facilities modifications and improvements. No projects are planned for FY 1998.	-1,500,000
-Completed funding for Congressionally directed projects.	-12,685,000
-Slight increase in funding for research on new biosensors.	+317,000

-Slight increase in funding for the development of new applications of imaging and laser technology with additional funds for equipment.	+461,000
-Slight increase in funding for molecular nuclear medicine.	+715,000
-Change in SBIR funding ($-388,000) due to decrease in operating budget for the Medical Applications and Measurement Science program. No STTR funding in FY 1998 ($-83,000).	-471,000
Total Funding Change, Medical Applications and Measurement Science	$-14,181,000

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

PROGRAM DIRECTION

I. Mission Supporting Goals/Ongoing Responsibilities:

This subprogram was transferred to the new Energy Research, Energy Supply Research and Development Program Direction decision unit in FY 1997 at the direction of Congress. Program direction provides for the federal staffing resources and related expenses necessary to plan, manage, lead, and coordinate the diverse research activities of the Biological and Environmental Research program conducted at the Department's national laboratories and at academic institutions and private industrial research centers. The staff manage a broad range of multidisciplinary research to underpin the major goals and objectives of the Department's strategic plan as well as national goals for a healthy citizenry and a cleaner environment.

Staff include scientific and technical personnel and program management support in the areas of budget and finance, personnel administration, grants and contracts, information resource management, policy review and coordination, and construction management.

II. Funding Schedule:

Activity	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Salaries and Benefits	$ 5,708	$ 0	$ 0	$ 0	$ 0
Travel	300	0	0	0	0
Support Services	450	0	0	0	0
Other Related Expenses	290	0	0	0	0
Total	$ 6,748	$ 0	$ 0	$ 0	$ 0
Full-time Equivalents	61	0	0	0	

III. Performance Summary

	FY 1996	FY 1997	FY 1998
Salaries and Benefits: Funded staff managing and supporting the Biological and Environmental Research program with reduced staffing levels as a result of streamlining efforts.	$5,708	$0	$0
Travel: Provided on-site contractor and facility oversight and participated in major scientific conferences to maintain state-of-the-art scientific expertise.	$300	$0	$0
Support Services: Provided computer system development, environment, health, and safety, and administrative support for the Biological and Environmental Research program.	$450	$0	$0
Other Related Expenses: Provided hardware and software for information technology improvements and other miscellaneous costs of supporting the program.	$290	$0	$0
Total	$6,748	$0	$0

IV. EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:

This subprogram was transferred to the new Energy Supply Research and Development Program Direction decision unit in FY 1997 at the direction of Congress.

Support Services	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Technical Support Service				
Feasibility of Design Considerations				
Economic and Environmental Analysis	150			
Test and Evaluation Studies				
Subtotal	150			
Management Support Services				
Management Studies				
Training and Education				
ADP Support	210			
Administrative Support Services	90			
Subtotal	300			
Total Support Services	450			
Use of Prior Year Balances				

Other Related Expenses	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Training				
Working Capital Fund				
Printing and Reproduction				
Rental Space				
Software Procurement/Maintenance Activities/Capital Acquisitions	220			
Other	70			
Total Obligational Authority	$290			
Use of Prior-Year Balances				
Total Budget Authority	$290			

BIOLOGICAL AND ENVIRONMENTAL RESEARCH

CONSTRUCTION

I. Mission Supporting Goals and Objectives:

Construction is needed to support the BER program. Cutting-edge basic research requires that state-of-the-art facilities be built or existing facilities modified to meet unique BER requirements.

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Construction	$62,620	$36,113	$ 0	$-36,113	-------
Total	$62,620	$36,113	$ 0	$-36,113	-------

III. Performance Summary- Accomplishments

	FY 1996	FY 1997	FY 1998
-Close out Biomedical Isotope Facility project at BNL	$ 25	$ 0	$ 0
-Complete funding for construction of the User Center for Structural Biology at the Advanced Light Source (ALS) in FY 1996.	2,600	0	0
-Complete funding for construction of the Structural Biology Center at the Argonne National Laboratory in FY 1996.	4,295	0	0
-Complete funding for construction of the EMSL at PNNL in FY 1997.	50,000	35,113	0
-Complete funding for construction of the Human Genome Laboratory at LBNL in FY 1997	5,700	1,000	0

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

-Decrease represents the successful completion of the construction of the EMSL and the Human Genome Laboratory.	$-36,113,000

BIOLOGICAL AND ENVIRONMENTAL RESEARCH
CAPITAL OPERATING EXPENSES AND CONSTRUCTION SUMMARY
(Dollars in thousands)

	FY 1996	FY 1997	FY 1998	$ Change	% Change
Capital Operating Expenses					
General Plant Projects (total)	$3,488	$4,837	$4,811	-$26	-0.5%
Facility Modifications and Improvements (total)	0	1,500	0	0	--
Capital Equipment (total)	20,841	23,525	23,057	-468	-2.0%

Construction Project Summary (both Operating and Construction Funded)

Project No.	Project Title	TEC	Previous Appropriated	FY 1996 Appropriated	FY 1997 Appropriated	FY 1998 Request	Unapprop. Balance
94-E-339	Human Genome Laboratory, LBNL	$24,634	$17,934	$5,700	$1,000	$0	$0
94-E-338	Structural Biology Center, ANL	14,876	10,581	4,295	0	0	0
94-E-337	ALS Structural Biology Support Facilities, LBNL	7,882	5,282	2,600	0	0	0
91-EM-100	Environmental Molecular Sciences Lab., PNL	207,900	122,787	50,000	35,113	0	0
91-E-310	Biomedical Isotope Facility, LBNL	2,325	2,300	25	0	0	0
Total Biological and Environmental Research		XXXXXX	$158,884	$62,620	$36,113	$0	$0

FUSION ENERGY SCIENCES

PROGRAM MISSION

The Fusion Energy Sciences program has changed from an energy technology development program to a program focused on the scientific foundations that underpin the fusion process. The mission of the Fusion Energy Sciences Program is to:

"Acquire the knowledge base needed for an economically and environmentally attractive fusion energy source."

Crucial to this mission is understanding how to limit the turbulent transport of particles and energy across the magnetic fields that are typically used to confine fusion energy fuels. Dramatic progress in this area has emerged in just the last two years after decades of research on this extremely difficult scientific problem which challenges the frontiers of both experimental investigation and theoretical description.

The GOAL of the Fusion Energy Sciences program is to work collaboratively within the international community to develop the scientific basis for a fusion energy development program. In pursuing this goal, the fusion program will also foster the advancement of plasma science which has applications in other fields of science and near-term industrial uses.

Specific OBJECTIVES related to the above goal are to:

Understand the physics of plasmas, the fourth state of matter. Plasmas comprise most of the universe, both stellar and interstellar, and have many practical applications;

Identify and explore innovative and cost-effective development paths to fusion energy . Practical fusion power will require an optimized toroidal approach building on the considerable tokamak experience, or a quite different approach, such as inertial fusion energy;

PROGRAM MISSION - FUSION ENERGY SCIENCES (Cont'd)

Explore the science and technology of energy producing plasmas, the next frontier in fusion research, as a partner in an international effort. Understanding the physics of self-heated plasmas and developing the technologies essential for fusion energy are linked goals that are achievable through the cooperative efforts of the world community.

PERFORMANCE MEASURES:

The scientific excellence of the fusion program is continually assessed by expert panels, by merit review with peer evaluations, by publications in scientific journals, by issuance of patents and citations, and by international standing. Also important are the contributions to other departmental and administration goals, such as supporting the science and technology infrastructure, strengthening science education, and enabling science and technology spin-offs. Performance measures for FY 1998 are:

1. Improve the understanding of the physics of plasmas.

2. Achieve new scientific discoveries and technological innovations that contribute to the scientific basis for a fusion power source.

3. Develop new simulation and computational tools that advance the ability to predictively model complex plasma phenomena.

4. Construct, on cost and schedule, and operate unique experimental facilities at the forefront of fusion energy science.

5. Progress on the International Thermonuclear Experimental Reactor (ITER) Engineering Design Activities (EDA). ITER would investigate the physics and technology of an energy-producing plasma source when built and operated.

6. Careful and effective management of the physical and human assets required to carry out the fusion research effort.

PROGRAM MISSION - FUSION ENERGY SCIENCES (Cont'd)

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- Fundamental discovery and analysis have led to a remarkable new understanding of how to reduce loss of energy from the core of a tokamak. Unique diagnostic probes and improved theoretical analyses have contributed to much improved performance of the tokamak facilities needed for high temperature plasma experiments. Experiments on Tokamak Fusion Test Reactor (TFTR) and Doublet III-D (DIII-D) have established thermal barriers that reduced the loss of plasma energy and particles to unprecedented levels. These results have demonstrated considerable progress in the scientific understanding needed for the ultimate objective of developing simpler, more economical fusion power systems.

- The world's first opportunity to study the detailed science associated with the production of fusion power using deuterium-tritium (D-T) fuel occurred over the past few years on TFTR at Princeton Plasma Physics Laboratory (PPPL). This device achieved over 10,000,000 watts of fusion power and provided numerous refined measurements of the fusion heating process. The research efforts on TFTR focused on completing the scientific objectives uniquely attainable in that device before shutting down to permit increased efforts on tokamak improvements and alternative concepts using other facilities. The process of shutting down TFTR and placing it in a mothball condition will be initiated in mid FY 1997.

- In FY 1998, funds previously used for the TFTR program in FY 1997 will be redirected to support construction of the National Spherical Torus Experiment at PPPL, national and international collaborative efforts involving PPPL physicists, enhancement of the DIII-D scientific mission and maintenance of the mothballed TFTR facility.

PROGRAM MISSION - FUSION ENERGY SCIENCES (Cont'd)

- The following table displays how the savings resulting from the shut down of TFTR will be redirected to allow the program to move forward with the implementation of the restructured program.

Reallocation of TFTR Program Funding
(B/A in thousands)

	FY 1997-98 Change
TFTR Shutdown	-24,836
NSTX Increase	7,600
PPPL Collaboration Abroad	1,965
Increase for DIII-D Research and Operations	7,464
Increase for Alcator C-MOD Research and Operations	2,464
Increase for Alternative Concepts Research	4,110
Increase for General Plasma Science	1,000
Increase for small scale plasma experiments	233

- In FY 1997 the Fusion Energy Sciences program continued on the course set in FY 1996, toward an international program aimed at studying the scientific aspects of energy producing plasmas with U.S. support for the ITER EDA sustained at the FY 1996 level. Also, the planning assumption for U.S. involvement in any future ITER construction was changed from significantly increased participation to participation at the current level. In FY 1997, the ITER EDA Detailed Design Report, including a cost estimate and a safety assessment, will be reviewed domestically, as well as with our international partners, to establish whether there is a technical basis for proceeding with ITER construction. The four ITER Parties are now engaged in pre-negotiations, i.e., non-committal discussions called Explorations, to determine whether acceptable construction arrangements can be established consistent with the limitations of each Party. If these Explorations are successful and if the Detailed Design Report is technically acceptable, then we would expect to join negotiations on a construction agreement. If these latter negotiations are successful, and if there is a successful technical conclusion to the ITER EDA, then we would expect to enter into a construction agreement within projected U.S. fusion program financial limitations.

- A principal Fusion Energy Sciences Advisory Committee (FESAC) recommendation was to increase the U.S. effort in innovative concepts research. This budget includes funds to continue work on an innovative new spherical torus experiment, the NSTX, as well as a new initiative for small-scale innovative concepts.

PROGRAM MISSION - FUSION ENERGY SCIENCES (Cont'd)

- A new initiative in general plasma science and engineering began in FY 1997, including a joint program with NSF targeted at university programs and a young investigators program providing research opportunities for tenure-track faculty in plasma science. In FY 1998, the plasma science initiative will be increased. This broad plasma research program will support not only fusion but other elements of the Department's energy and defense missions.

FUSION ENERGY SCIENCES
PROGRAM FUNDING PROFILE
(Dollars in thousands)

Subprogram	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Science	$88,552	$101,529	$0	$101,529	$103,281
Facility Operations	68,067	58,171	0	58,171	47,519
Technology	73,587	64,400	0	64,400	67,300
Program Direction	8,734	8,400	0	8,400	6,900
Subtotal, Fusion Energy Sciences	238,940	232,500	0	232,500	225,000
Adjustment	0	-2,069 a/	0	-2,069 a/	0
TOTAL, FES	$238,940 b/	$230,431	$0	$230,431	$225,000
Full-Time Equivalents	70	62		62	49

a/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

b/ Excludes $4,491,000 which was transferred to the SBIR program and $342,000 which was transferred to the STTR program.

Public Law Authorization:

Pub. Law 95-91, DOE Organization Act

FUSION ENERGY SCIENCES
(Dollars in thousands)

PROGRAM FUNDING BY SITE

Field Offices/Sites	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Albuquerque Operations Office					
Los Alamos National Laboratory	$4,610	$3,456	$0	$3,456	$3,356
Sandia National Laboratories	5,675	5,245	0	5,245	5,555
Chicago Operations Office					
Argonne National Laboratory	5,307	1,915	0	1,915	2,560
Brookhaven National Laboratory	97	60	0	60	50
Princeton Plasma Physics Laboratory	60,057	55,873	0	55,873	47,623
Idaho Operations Office					
Idaho National Engineering Laboratory	2,494	2,360	0	2,360	2,360
Oakland Operations Office					
Lawrence Berkeley National Laboratory	5,182	11,650	0	11,650	4,240
Lawrence Livermore National Laboratory	17,094	9,272	0	9,272	8,910
Stanford Linear Accelerator Center	50	50	0	50	50
Oak Ridge Operations Office					
Oak Ridge Institute for Science & Education	1,111	867	0	867	0
Oak Ridge National Laboratory	19,415	16,244	0	16,244	16,740
Thomas Jefferson National Accelerator Facility	5	0	0	0	0
Richland Operations Office					
Pacific Northwest Laboratory	1,472	1,190	0	1,190	1,230
Savannah River Operations Office					
Savannah River Tech Center	218	270	0	270	270
All Other Sites	116,153	124,048	0	124,048	132,056
Subtotal	238,940	232,500	0	232,500	225,000
Adjustment	0	-2,069 a/	0	-2,069 a/	0
TOTAL	$238,940 b/	$230,431	$0	$230,431	$225,000

a/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

b/ Excludes $4,491,000 which was transferred to the SBIR program and $342,000 which was transferred to the STTR program.

FUSION ENERGY SCIENCES

SCIENCE

I. Mission Supporting Goals and Objectives: This subprogram provides funding for scientists and support staff at universities and laboratories that carry out research in fusion plasma science. The experimental and theoretical research activities include planning, design, fabrication, and installation of diagnostics and small experiments, conduct of experiments, analysis of data, computation and publication of results.

Plasma science is the study of the behavior of ionized states of matter -- ranging from fluorescent lights to stars -- that make up 99 percent of the visible universe. It contributes not only to fusion energy research, which has driven the intellectual development of plasma science, but also to many national science and technology goals, ranging from astrophysics to industrial processing and national security. One of the objectives of the Science Subprogram is to broaden the intellectual and institutional base in fundamental plasma physics, preferably in partnership with other agencies. A joint DOE/National Science Foundation plasma science partnership, begun in FY 1997, addresses important research topics in plasma science and engineering.

Fusion plasma science advances through a balance of large- and small-scale experimentation, theory, and modeling. The largest experimental component is the tokamak experimental research activity which is focused on gaining a predictive understanding of the behavior of hot confined plasmas using existing U.S. research facilities (e.g., Alcator C-MOD, and DIII-D) and through international collaborations on state-of-the-art foreign experimental facilities. The central scientific issue is that of improving plasma energy confinement, (or, conversely, reducing energy transport) which is the subject of intensive study using a variety of theoretical models developed and refined from an ever growing worldwide experimental data base. In addition, this effort contributes to resolving physics issues for the design of ITER and the development of fusion as an energy source for the future.

Research on alternative confinement concepts (magnetic and inertial) will be pursued to identify approaches which may improve the economical and environmental attractiveness of fusion energy. This research will be carried out at levels appropriate to the state of advancement of the approach. This includes small scale exploratory programs primarily at universities as well as more advanced physics experiments as exemplified by the National Spherical Torus Experiment (NSTX) which is currently being fabricated at PPPL. Efforts in inertial fusion energy (IFE) will focus on development and assessment of the most efficient methods that provide a heating process for the inertial fusion energy concept.

A particularly critical component for progress in fusion science is the development and use of theoretical and computational tools to provide and verify detailed scientific understanding of the physical phenomena that govern the confinement of high temperature plasmas.

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Tokamak Experimental Research	$47,721	$54,027	$58,928	$+ 4,901	+ 9.1 %
Alternative Concept Experimental Research	14,357	15,350	19,460	+ 4,110	+26.8%
Theory	26,244	25,300	17,500	- 7,800	-30.8%
General Plasma Science	230	3,000	4,000	+ 1,000	+33.3%
SBIR/STTR	0	3,852	3,393	- 459	- 11.9 %
Total Science	$88,552	$101,529	$103,281	$ +1,752	+ 1.7%

III. Performance Summary - Accomplishments

	FY 1996	FY 1997	FY 1998
TOKAMAK EXPERIMENTAL RESEARCH	$47,721	$54,027	$58,928

Tokamak Experimental Research provides support for physicists and engineers to carry out the scientific research program on domestic tokamak facilities, as well as for U.S. collaborations with European, Japanese, and Russian scientists on major fusion experiments abroad. These foreign collaborative programs have enhanced the productivity of the U.S. Program, and will expand somewhat in FY 1998 with the shift of some PPPL scientific personnel to collaborations on major facilities in Japan and Europe. PPPL will also have a major collaborative effort on DIII-D and Alcator C-Modified.

Tokamak experiments are aimed at investigating a wide range of scientific issues, particularly the causes of plasma energy loss relevant to the design of future advanced tokamaks (e.g., ITER). Results have demonstrated record-breaking fusion power using D-T plasmas and that the confinement of plasma

III. Performance Summary- Accomplishments

	FY 1996	FY 1997	FY 1998
energy and particles can be dramatically improved by modifying the magnetic field to create an energy barrier within the plasma. Other key research topics which are important for future tokamaks include development of efficient heat removal systems and advanced operating techniques to support long pulse operation.			
In addition to experiments on large tokamaks, the program supports small scale experiments, advanced diagnostic development, and atomic data for fusion. These small scale experiments permit cost-effective initial exploration of promising improvements in the tokamak confinement concept and are conducted primarily at universities.			
ALTERNATIVE CONCEPT EXPERIMENTAL RESEARCH	14,357	15,350	19,460
The alternative concepts development program studies magnetic confinement configurations other than the conventional tokamak, both for their scientific value and as reactor concepts that may have advantages compared to the conventional tokamak. Approximately 15 experimental programs, located primarily at universities, are supported with these funds. Noteworthy, among many recent successes, is the completion of the experimental data base upon which a favorable decision to proceed with a proof-of-principle spherical torus experiment (NSTX) has been based.			
The National Spherical Torus Experiment (NSTX) will address the fundamental plasma and fusion science issues, such as current drive by radio frequency waves, very intense levels of fusion power and nearly total self-generation of current to produce fusion plasma confinement in an ultra-			

	FY 1996	FY 1997	FY 1998
compact tokamak. Plans will be developed starting in FY 1997 to establish a national NSTX research program with broad participation by scientists at U.S. universities, industries, and laboratories. The scientific research program on NSTX is scheduled to commence in mid FY 1999.			
In the area of Inertial Fusion Energy, research will continue on the ion beam drive methods and supporting critical technology issues.			
THEORY	26,244 a/	25,300 a/	17,500
The theory program provides broadly based support for the fusion energy sciences program in three areas; basic theory of plasma behavior, development of techniques and codes to model plasmas of fusion interest, and support of experimental programs. The Fusion Energy Sciences program has proposed to the DOE 2000 initiative, a program to develop new application codes and a code library for use by fusion researchers, and advanced, widely applicable, methods of remote participation in experiments.			
GENERAL PLASMA SCIENCE	230	3,000	4,000
The general plasma science program is directed toward enhancing basic plasma science research, primarily in the university community; through initiatives for young investigators and announcements of research opportunities coordinated with other government agencies, e.g. NSF. Advances in plasma physics will support the fusion energy sciences program as well as other multi-disciplinary fields of importance to science and technology.			

a/ Includes $7,740,000 in FY 1996 and $7,370,000 in FY 1997 for Computational support at the NERSC. In FY 1998 all funds for NERSC operations are budgeted in the Computational and Technology Research program.

SBIR/STTR FUNDING	FY 1996	FY 1997	FY 1998
In FY 1996 $2,882,000 and $220,000 were transferred to the SBIR and STTR programs respectively. The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only since Part D, Section 110 of P.L. 104-208, making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.	0	3,852	3,393
TOTAL SCIENCE	$88,552	$101,529	$103,281

EXPLANATION OF FUNDING CHANGES FY 1997 TO FY 1998:

Funding for TFTR is reduced by $2,915,000 primarily from further reductions in staff, resulting from permanently shutting down the facility in mid FY 1997 and placing it in a mothball status. Further reductions for TFTR are accounted for under the Facilities Operation subprogram. The shut down of TFTR will enable the two remaining major tokamaks, DIII-D and Alcator C-MOD, to be operated at a more scientifically productive rate in FY 1998 and permit increasing effort on alternative concepts, such as fabrication of the NSTX.	-$2,915,000
Increases in funding for DIII-D of $4,425,000, Alcator C-Mod of $1,674,000 and International $2,015,000 reflect increased efforts resulting from collaborations by PPPL staff on these facilities as well as European and Japanese devices (following the shutdown of the TFTR experiment).	+$8,114,000
Smaller scale plasma experiments and diagnostic development are increased $536,000.	+$536,000
Reductions of $834,000 are primarily associated with reduction for traineeships.	-$834,000
The FY 1998 level for theory is essentially comparable with the FY 1997 level, except for funding to support National Energy Research Scientific Computing Center, that is budgeted for in the Computational and Technology Research program in FY 1998.	-$7,800,000

EXPLANATION OF FUNDING CHANGES FY 1997 TO FY 1998 (Cont'd):

An additional $1,000,000 is provided for increasing the breadth of participation in the basic plasma science initiative which began in FY 1997.	+$1,000,000
An increase of $4,110,000 is provided to enhance operations of existing alternative concept experiments and to support an innovative concepts initiative.	+$4,110,000
SBIR/STTR funding requirements are decreased $459,000 primarily associated with the termination of STTR.	-$459,000
Total Funding Change, Science	$+1,752,000

FUSION ENERGY SCIENCES

FACILITY OPERATIONS

I. Mission Supporting Goals and Objectives: This activity provides for the operation of major experimental facilities which are the essential tools that enable scientists in university, industry and laboratory based research groups to perform experimental research in fusion energy sciences. This subprogram includes funding for the operation and maintenance of the three major fusion research facilities: TFTR at the Princeton Plasma Physics Laboratory (PPPL), DIII-D at General Atomics (GA), and Alcator C-Mod at the Massachusetts Institute of Technology (MIT). These facilities consist of magnetic plasma confinement devices, plasma heating and current drive systems, diagnostics and instrumentation, experimental areas, computing and computer networking facilities, and other auxiliary systems. It includes the cost of operating personnel, electric power, expendable supplies, replacement parts and subsystems, and inventories. In the case of PPPL, this funding also supports the safe shutdown and mothballing of TFTR. General plant projects (GPP) funding for PPPL will be provided to support minor new construction, other capital alterations and additions, and for buildings and utility systems. Capital equipment (CE) funding for upgrading the research capability of DIII-D is also included, as are funds for design, fabrication and installation of NSTX.

The ultimate measure of success in this activity is whether the research scientists have data of sufficient quantity and quality to carry out their planned experiments or to discover new phenomena. The quality of data is dependent on the confinement device capabilities, and those of the plasma diagnostic and data processing equipment, and the degree to which those capabilities are achieved during a particular operating period. The quantity of data relates primarily to the operational availability of the facility and its data acquisition systems.

The principal objective of the Facility Operations Subprogram is to maximize the quantity and quality of data collected for approved experiments being conducted at FES facilities.

The following table summarizes the scheduled weeks of operations for DIII-D, Alcator C-Mod and TFTR. This table illustrates how the redirection of TFTR funds allows for increased operations of C-Mod and DIII-D.

Facility Utilization
(Weeks of Operation)

	FY 1996	FY 1997	FY 1998
TFTR	22	6-8	0
DIII-D	16	8	16
Alcator C-Mod	15	6-8	10-12

FUSION ENERGY SCIENCES
FACILITY OPERATIONS

II. Funding Schedule:

Program Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Princeton Plasma Physics Laboratory .	$43,492	$30,971	$16,490	- 14,481	- 46.8%
General Atomics	18,575	19,100	22,139	+ 3,039	+15.9%
Massachusetts Institute of Technology	6,000	8,100	8,890	+ 790	+ 9.8%
Total Facility Operations	$68,067	$58,171	$47,519	- 10,652	- 18.3%

III. Performance Summary - Accomplishments

	FY 1996	FY 1997	FY 1998
Princeton Plasma Physics Laboratory	$43,492	$30,971	$16,490

TFTR will complete the highest priority D-T experiments by mid-FY 1997 and then enter into a process of safe and orderly shutdown. These funds provide for operation, maintenance, safe shutdown and caretaking of the TFTR facility, as well as for design, fabrication, and installation of the NSTX using existing equipment and facilities at the PPPL site. The maintenance of the laboratory physical plant is also supported.

- TFTR
  - -- FY 1996 - plasma operation using deuterium and D-T fuel for 22 weeks; followed by a maintenance and upgrade outage.
  - -- FY 1997 - plasma operation using deuterium and D-T fuel for 6-8 weeks; followed by safe shutdown and mothballing.
  - -- FY 1998 - maintained in mothball condition.

III. Performance Summary - Accomplishments	FY 1996	FY 1997	FY 1998
• NSTX Design, Fabrication, Installation			
-- FY 1996 - completed and reviewed engineering design, schedule, and cost estimates.			
-- FY 1997 - complete final design and start fabrication of components.			
-- FY 1998 - complete component fabrication and start assembly/installation.			
General Atomics	18,575	19,100	22,139

Provides support for operation, maintenance, improvement and enhancement of the DIII-D facility and supporting equipment at the GA site. A planned equipment enhancement of DIII-D includes increasing the microwave heating power and upgrading power supplies and other systems needed to extend the maximum operating pulse length.

- DIII-D
  - -- FY 1996 - plasma operation using hydrogen and deuterium fuel for 16 weeks; followed by a maintenance and upgrade outage.
  - -- FY 1997 - plasma operation using hydrogen and deuterium fuel for 8 weeks; plus down time for upgrades and maintenance.
  - -- FY 1998 - plasma operation using hydrogen and deuterium fuel for 16 weeks; plus down time for upgrades and maintenance.

FUSION ENERGY SCIENCES
FACILITY OPERATIONS

III. Performance Summary - Accomplishments

	FY 1996	FY 1997	FY 1998
MIT	6,000	8,100	8,890

Provides support for operation, maintenance, improvement and enhancement of the Alcator C-Mod facility and supporting equipment at the MIT site.

- Alcator C-Mod
  - -- FY 1996 - plasma operation using hydrogen and deuterium fuel for 15 weeks plus down time for maintenance.
  - -- FY 1997 - plasma operation using hydrogen and deuterium fuel for 6-8 weeks plus down time for maintenance.
  - -- FY 1998 - plasma operation using hydrogen and deuterium fuel for 10-12 weeks plus down time for maintenance.

TOTAL FACILITY OPERATIONS	$68,067	$58,171	$47,519

EXPLANATION OF FUNDING CHANGES FY 1997 TO FY 1998:

A decrease of $21,621,000 results from shutting down the TFTR at PPPL. This is partially offset by an increase of $7,140,000 in funding for fabrication and installation of NSTX.	-$14,481,000
The increase of $3,039,000 at GA supports more DIII-D experimental run time and continuing the upgrade of the DIII-D heat removal system.	+$3,039,000
The increase of $790,000 at MIT supports more Alcator C-Modified experimental run time.	+$790,000
Total Funding Change, Facility Operation	-$10,652,000

FUSION ENERGY SCIENCES

TECHNOLOGY

I. Mission Supporting Goals and Objectives: The Technology Subprogram provides the technological foundation for current fusion science as well as the research and engineering required to advance fusion science in future fusion experiments. Research will be performed in the areas of superconducting magnets, plasma heating and fueling, safety, plasma control, fuel processing and breeding, heat removal and high performance materials. Research and engineering design in support of the International Thermonuclear Experimental Reactor (ITER) Engineering Design Activities (EDA) is included in this Subprogram. At present, the four ITER parties are now engaged in pre-negotiations, i.e., non-committal discussions called "Explorations", to determine whether acceptable construction arrangements can be established consistent with the limitations of each party. It also includes the technology research necessary to establish the knowledge base needed for an economically and environmentally attractive fusion energy source, as well as assessments of critical aspects of integrated fusion systems. Research on low-activation materials will be focused on high performance fusion system materials capable of withstanding long-term exposure to energetic particles and electromagnetic radiation from fusion plasma reactions.

II. Funding Schedule:

Program Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Engineering Research	$65,721	$56,536	$59,725	$+3,189	+ 5.6%
Materials Research	7,866	6,000	5,900	- 100	- 1.7%
SBIR	0	1,864	1,675	- 189	-10.1%
Total Technology	$73,587	$64,400	$67,300	$+2,900	+ 4.5%

III. Performance Summary - Accomplishments

	FY 1996	FY 1997	FY 1998
ENGINEERING RESEARCH	$65,721	$56,536	$59,725

The ITER EDA is the principal activity within Engineering Research and will be completed by the four ITER parties in FY 1998. The culmination of 6 years of design and supporting R&D, including preparation of a construction cost estimate and schedule, will be documented in the Final Design Report. This

III. Performance Summary - Accomplishments

report will serve as the technical basis for decisions on whether and where to build the ITER facility and whether and how to transition from the current working arrangements to a construction activity. In FY 1997, the Detailed Design Report will be completed and a review is underway.

The following table summarizes ITER EDA funding:

		B/A ($000)			
FY 1993	FY 1994	FY 1995	FY 1996	FY 1997	FY 1998
51,936	62,731	69,349	54,438	54,736	54,500

Research on fusion plasma technologies of superconducting magnets, plasma facing components, and heating and fueling systems will continue at laboratories and universities. This work is needed in order to provide advanced technology components and systems required for the conduct of fusion plasma research. In addition, research on fusion safety, fuel breeding and processing systems will continue. This work is needed in order to provide a technical basis for future decisions on how and when to initiate larger scale development of these systems.

System studies of current as well as advanced fusion concepts and configurations will continue. This work is needed in order to provide guidance and direction for future program activities.

The FY 1998 work is essential in order to reach a decision on construction and also to complete satisfactorily the ITER design and R&D activities for future generic use within the U.S. domestic fusion program.

III. Performance Summary - Accomplishments

	FY 1996	FY 1997	FY 1998
MATERIALS RESEARCH	7,866	6,000	5,900

Development and testing of vanadium alloys, silicon carbide composite materials and advanced ferritic steels for structural service in the high power zones of fusion power systems will continue. Conceptual design of a fusion materials neutron source facility was completed in FY 1997 by an international team under the auspices of the International Energy Agency (IEA). U.S. involvement in the follow-on design and planning work will continue at a low level in FY 1998, in parallel with discussions among the IEA partners on their possible interest in constructing such a facility. If they decide to proceed toward construction, it is anticipated that the U.S. could also decide to participate, albeit at a very modest level. This work is a key element in developing safe, reliable and environmentally attractive fusion systems.

SBIR/STTR FUNDING	0	1,864	1,675

In FY 1996, $1,609,000 and $122,000 were transferred to the SBIR and STTR programs respectively. The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only since Part D, Section 110 of P.L. 104-208, making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.

TOTAL TECHNOLOGY	$73,587	$64,400	$67,300

FUSION ENERGY SCIENCES
TECHNOLOGY

EXPLANATION OF FUNDING CHANGES FY 1997 TO FY 1998:

Program elements continue at essentially the FY 1997 level with modest increases in system studies and in research for advanced technologies in the areas of heating, blankets, and safety. The total increase of $2,900,000 provides for comparative studies of the alternative physics concepts and research on advanced plasma heating methods for use in current fusion experiments and on fusion blanket techniques that would have broad applicability to any fusion concept. In addition, safety evaluations will be conducted on the various alternate concepts.	$2,900,000
Total Funding Change, Technology	+$2,900,000

Major Issue

After the completion of the ITER EDA, the U.S. will determine whether it should continue to participate with the other ITER parties in the ITER construction, operation, and experimental activities in some limited form, if international construction proceeds.

FUSION ENERGY SCIENCES

PROGRAM DIRECTION

I. Mission Supporting Goals and Objectives: This subprogram provides the Federal staffing resources and associated funding needed to plan, direct, manage, and administer the highly complex scientific and technical research and development program in fusion energy. The Fusion Energy Sciences program is developing the magnetic and inertial approaches to attaining fusion energy as two separate and distinct programs, coordinating, on inertial fusion, with the Office of Defense Programs. International collaboration is an essential element of the program strategy and requires extensive coordination efforts.

Beginning in FY 1997, program organizations are contributing to a Working Capital Fund to cover the costs of centrally provided goods and services such as supplies, housing, utilities, audit services, etc., which previously were budgeted in Departmental Administration. In the FY 1998 request for Fusion Energy Sciences Program Direction, $500,000 has been included for the Working Capital Fund.

II. Funding Table:

	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Chicago					
Salary and Benefits	$1,055	$1,028	$0	$1,028	$910
Travel	120	120	0	120	74
Support Services	0	0	0	0	0
Other Related Expenses ..	215	200	0	200	190
Total	$1,390	$1,348	$0	$1,348	$1,174
Full-Time Equivalents ...	17	12	0	12	10
Oakland					
Salary and Benefits	$167	$174	$0	$174	$184
Travel	17	14	0	14	14
Support Services	0	0	0	0	0
Other Related Expenses ..	2	2	0	2	2
Total	$186	$190	0	$190	$200
Full-Time Equivalents ...	2	2	0	2	2

II. Funding Table (cont'd):

	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Headquarters					
Salary and Benefits	5,499	4,776	0	4,776	4,001
Travel	285	250	0	250	225
Support Services	1,000	980	0	980	600
Other Related Expenses a/	374	856	0	856	700
Total	$7,158	$6,862	$0	$6,862	$5,526
Full Time Equivalents ...	51	48	0	48	37
Total Fusion Energy Sciences					
Salary and Benefits	6,721	5,978	0	5,978	5,095
Travel	422	384	0	384	313
Support Services	1,000	980	0	980	600
Other Related Expenses .	591	1,058	0	1,058	892
Grand Total	$8,734	$8,400	$0	$8,400	$6,900
Full-Time Equivalents ...	70	62	0	62	49
Adjustment	0	-80 b/	0	-80 b/	0
Budget Authority	$8,734	$8,320	$0	$8,320	$6,900

a/ Other Related Expenses line in Headquarters includes Working Capital Fund estimates starting in FY 1997 and FY 1998.
b/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

III. Performance Summary:	FY 1996	FY 1997	FY 1998
Salaries and Benefits: Reductions of 5 FTEs in FY 1997 and 2 in FY 1998 in Chicago result from cutbacks in the Fusion Energy Sciences Program at Princeton. Reductions of 3 FTEs in FY 1997 and 11 in FY 1998 at Headquarters result from streamlining and reorganization of the Office of Fusion Energy Sciences in response to direction from Congress and the recommendations of the Fusion Energy Sciences Advisory Committee regarding reorientation of the Fusion Energy Sciences Program.	$6,721	$5,978	$5,095
Travel: The reductions in travel in FY 1997 and FY 1998 are due to decreases in the number of travelers, as well as increased use of alternatives to travel, such as teleconferencing.	422	384	313
Support Services: Reductions in support services in both years result from the decrease in the size of the Fusion Energy Sciences Program. Support services provide for the program's mailroom, travel processing, technical support and computer systems development needs. Energy Research has the best record in the Department for judicious use of support services.	1,000	980	600
Other Related Expenses: The estimates for FY 1997 and FY 1998 include $600,000 and $500,000, respectively, for the new Headquarters Working Capital Fund. The remaining funds cover hardware and software for information architecture as well as rent and utilities for field staff.	591	1,058	892
TOTAL PROGRAM DIRECTION	$8,734	$8,400	$6,900

EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:

Decrease of $883,000 in salaries and benefits resulting from the impact of the decrease in FTEs which is partially offset by general pay increases and promotions.	-$883,000
Decrease of $71,000 in travel is due to fewer travelers because of staffing reductions and increased use of alternatives to travel.	-$71,000
Decrease of $380,000 in support services is due to the decreases in the staff to be supported and in the size of the Fusion Energy Sciences program.	-$380,000
Decrease of $166,000 for other related expenses is due to reductions of $100,000 in the Working Capital Fund as a result of fewer staff to support and $66,000 in information infrastructure costs and rent and utilities in the field, also due to staffing reductions.	-$166,000
Total	-$1,500,000

Support Services	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Technical Support Service				
Feasibility of Design Considerations				
Economic and Environmental Analysis				
Test and Evaluation Studies				
Subtotal	0	0	0	0
Management Support Services				
Management Studies				
Training and Education	10	10	5	-5
ADP Support	530	520	245	-275
Administrative Support Services	460	450	350	-100
Subtotal	1,000	980	600	-380
Total Support Services	1,000	980	600	-380
Use of Prior Year Balances				

Other Related Expenses	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Training				
Working Capital Fund	0	600	500	-100
Printing and Reproduction				
Rental Space	35	30	26	-4
Software Procurement/Maintenance Activities/Capital Acquisitions	556	428	366	-62
Other				
Total Obligational Authority	591	1,058	892	-166
Use of Prior-Year Balances				
Total Budget Authority	591	1,058	892	-166

FUSION ENERGY SCIENCES CAPITAL OPERATING EXPENSES & CONSTRUCTION SUMMARY
(Tabular dollars in thousands, narrative in whole dollars)

	FY 1996	FY 1997	FY 1998	$ Change	% Change
Capital Operating Expenses					
General Plant Projects (total)	$ 500	$ 300	$ 600	$+ 300	+100.0%
Capital Equipment (total)	3,670	5,917	14,790	+ 8,873	+150.0%

Major Items of Equipment (CE $2 Million and Above)

	TEC	Previous Approp.	FY 1996 Approp.	FY 1997 Approp.	FY 1998 Request	Acceptance Date
1. DIII-D Upgrade	$32,400	$14,300	$ 1,675	$ 1,500	2,440	FY 2000
2. NSTX	18,500 a/	0	0	3,450	11,300	FY 1999

a/ The preliminary TEC for NSTX is $18,500,000, plus $2,700,000 of associated operating funding to provide for conceptual design, physics support and R&D. A revised cost estimate, now under review, will be based on the detailed engineering design and will account for installing the experiment at the TFTR site rather than the originally planned location. The TEC will increase modestly, but the TFTR site will provide much greater research capability by allowing the use of TFTR's neutral beams and power systems.

BASIC ENERGY SCIENCES

PROGRAM MISSION

The mission of the Basic Energy Sciences (BES) program is to support basic research in the natural sciences leading to new and improved energy technologies and to understanding and mitigating the environmental impacts of energy technologies.

The GOAL of the BES program is:

To support a world-class, peer-reviewed fundamental research program in areas relevant to energy resources, production, conversion, and efficiency and to the mitigation of the adverse impacts of energy production and use; to operate major scientific user facilities for support of forefront research in areas important to BES activities and also in areas that extend beyond the scope of BES activities such as structural biology, medical imaging, and micromachining; to plan, design, and construct the next generation of such facilities; and to act as a steward of human resources and institutions to ensure stable, essential research communities and premier national user facilities. BES serves as the Nation's primary or sole steward of a number of essential research activities including fundamental research in heavy element chemistry, the fundamental bases of solar energy conversion, combustion related science, organometallic chemistry, catalysis, separations science, radiation chemistry, and radiation effects in materials. To accomplish these missions, BES supports basic research in materials sciences, chemical sciences, geosciences, plant and microbial biosciences, and engineering sciences. Research in advanced energy projects and applied mathematical sciences was transferred to the Computational and Technology Research Program in FY 1997.

PROGRAM MISSION - BASIC ENERGY SCIENCES (Cont'd)

The OBJECTIVES related to these goals are:

1. To OBTAIN MAJOR NEW FUNDAMENTAL KNOWLEDGE - Conduct broad-based, forward-looking fundamental research to create new scientific and engineering knowledge in support of the BES mission.

2. To CONTRIBUTE TO THE COLLECTIVE DOE MISSION - Use established management practices to link BES staff and principal investigators with their counterparts in the energy technology offices and in industry in order to contribute to DOE missions in areas of energy efficiency, renewable energy resources, improved utilization of fossil fuels, reduced environmental impacts of energy use, future fusion energy sources, and science-based stockpile stewardship. Such management practices include cofunding and collocating fundamental research programs supported by BES with applied research programs supported by the technology offices at the national laboratories.

3. To PROVIDE WORLD-CLASS SCIENTIFIC FACILITIES - Plan, construct, and operate major national user facilities to serve researchers at universities, national laboratories, and industrial laboratories. These scientific facilities - which enable advancement of basic knowledge and the development of new products, materials, and manufacturing processes - include synchrotron radiation light sources, high-flux neutron sources, electron-beam microcharacterization centers, and specialized facilities such as the Combustion Research Facility.

4. To ENSURE THAT RESEARCH RESULTS ARE OF THE HIGHEST QUALITY AND ARE WIDELY DISSEMINATED AND USED - Promote excellence in basic research through peer review. Promote open communication and the transfer of information, know-how, and technology by publication of results in the open, peer-reviewed literature and by presentation and discussion of results at workshops and conferences. Promote the use of the results of basic research by encouraging effective interactions between the basic and applied research communities.

SCIENTIFIC FACILITIES UTILIZATION:

The BES program request includes $276,846,000 to maintain support of the scientific user facilities. This funding will maintain the quality of service and availability of facility resources to users at the highest level possible consistent with overall budgetary constraints. Research communities that have benefited from the BES supported Scientific Facilities Initiative include materials sciences, chemical sciences, earth and geosciences, environmental sciences, structural biology, superconductor technology, and medical research and technology development.

PROGRAM MISSION - BASIC ENERGY SCIENCES (Cont'd)

PERFORMANCE MEASURES:

BES, like other programs that fund basic research, is working to understand the application of performance measures to its activities. During FY 1997, BES will formalize this understanding. It is anticipated that the process will involve the elements described below.

BES is a prototypical example of a large, diverse, and robust basic research program that exists within a mission agency. BES will use performance measures to evaluate four basic activities that characterize this special role. The first three correspond to the fundamental tenets or principles of BES. These are: (1) excellence in basic research, (2) relevance to the broad energy mission of the agency, and (3) stewardship of research performers, essential scientific disciplines, institutions, and scientific user facilities. Combining and sustaining these tenets is the management challenge (and vision) of BES. The fourth activity to be evaluated, therefore, is program management. These activities will be measured in a number of ways, which separate naturally into four categories: (1) peer review, (2) metrics (i.e., things that can be counted), (3) customer evaluation and stakeholder input, and (4) qualitative assessments, which might include historical retrospectives and annual program highlights.

During FY 1997, a matrix of activities to be measured versus performance measures will be constructed, and the importance of the various measurement techniques contained within the matrix will be assessed. Many standard measurement techniques are already in place. Indeed, some have been in place for many years. These include: peer review of all research programs; determination of metrics such as number of users at the facilities, number of beam hours delivered at the facilities, and number of peer reviewed publications; and customer surveys, e.g., of the scientific user facilities. During FY 1997, BES will establish baselines for selected metrics, will codify the peer review processes for national laboratory research and for facilities, and will proceed with other selected activities such as studies of the impacts of basic research on technology and the culture that promotes excellence in basic research at the national laboratories.

PROGRAM MISSION - BASIC ENERGY SCIENCES (Cont'd)

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- Richard E. Smalley (Rice University), supported by the BES Chemical Sciences Division, shared in the 1996 Nobel Prize for Chemistry for the "collaborative discovery that carbon could occur in a uniquely beautiful and satisfying structure that engendered an entirely new branch of chemistry."

- A joint BES/Energy Efficiency research team at Oak Ridge National Laboratory developed a high-temperature superconducting tape with record current carrying capacities in high magnetic fields. The technique, dubbed RABiTS (rolling assisted, biaxially textured substrates), uses metal strips fabricated with a high degree of crystallographic alignment or "texture" that can be imparted to a superconductor deposited on the strip. The critical current density obtained, greater than 650,000 amperes per square centimeter at 77 degrees Kelvin, is the highest obtained by any process considered scaleable to production of long lengths.

- The first genome sequencing effort on a higher plant was initiated with the formation of an international, multiagency project focusing on the model plant *Arabidopsis thaliana.* The >100 megabase genome should be sequenced by 2004 by groups in Japan, France, the U.S., and a European consortium. The information will provide insight into plant growth and development with potential applications ranging from agriculture and forestry to energy production and environmental cleanup.

- Lawrence Berkeley National Laboratory researchers developed a way to enhance the sensitivity of nuclear magnetic resonance (NMR) and magnetic resonance imaging (MRI) by using hyperpolarized atomic xenon to polarize the hydrogen atoms in sample systems. Since soluble proteins and other biological structures have large numbers of protons, the enhancement of the MRI signal promises great value.

- The national scientific user facilities continued to operate more efficiently as a result of the Scientific Facilities Initiative begun in FY 1996. This initiative has provided substantial increases in operating hours, which in turn have enabled greater numbers of experiments to be performed and access to the facilities for greater numbers of users. Funds will continue to be provided for beamline fabrication and instrument development.

- Construction of the Combustion Research Facility, Phase II, continued with completion scheduled for FY 1999.

- The Advanced Photon Source became fully operational.

- Atomic and molecular level understanding of complex phenomena led to better structural materials, adhesion in composite materials, corrosion resistance, control of chemical reactions in combustion and processing, rock-fluid mechanics, and biological energy conversion.

PROGRAM MISSION - BASIC ENERGY SCIENCES (Cont'd)

- Advances in theory and modeling were applied to more complex materials and phenomena to discover new materials for improved energy technologies.

- Continuing basic research supporting: vehicles of the future, environmentally responsive technologies, and sustainable development will provide the basis for lighter, more efficient automobiles and for lower costs and environmental impacts in energy production and use.

Neutron Source Activities:

To maintain a strong U.S. position in the field of neutron science following the termination of the Advanced Neutron Source (ANS) project in FY 1995, the Department will continue to support selected enhancements of existing reactor and spallation neutron sources (as described below) and will proceed with the planning of the National Spallation Neutron Source (NSNS).

BES will initiate in FY 1998 the fabrication of instrumentation for the short-pulse spallation source at the Manuel Lujan Jr. Neutron Scattering Center at the Los Alamos Neutron Science Center (LANSCE). This instrumentation enhancement project will be undertaken concurrently with an accelerator enhancement project at LANSCE funded by the Department's Office of Defense Programs. Together, these enhancements will result in a state-of-the-art short-pulse spallation source facility for neutron scattering, radiography, and science-based stockpile stewardship.

The conceptual design of the National Spallation Neutron Source (NSNS) will be completed in FY 1997. FY 1998 funding of $23,000,000 is requested for pre-title I activities for the NSNS. The design of the NSNS will conform to the recommendations of the Basic Energy Sciences Advisory Committee (BESAC). Power from the NSNS will be in the 1 megawatt range or about six times that of the highest currently available worldwide, and NSNS's design will allow for significantly higher powers at a later stage. The design will further include moderators for neutrons with appropriate spectral and temporal characteristics in the epithermal, thermal, and cold energy ranges. This will provide expanded capabilities for research in physical, chemical, materials, biological, and medical sciences. There will be the potential for at least three target areas and for 30 to 40 instruments. It is expected that the NSNS will serve over 1,000 users per year. The conceptual design is an interlaboratory effort that involves Lawrence Berkeley National Laboratory in ion sources, Los Alamos National Laboratory and Brookhaven National Laboratory in accelerators, and Argonne National Laboratory in targets and moderators. Oak Ridge National Laboratory is responsible for project management and coordination of the technical design. Oak Ridge National Laboratory will also participate in target and moderator design and in instrumentation design and development. In addition, agreements are in place with Rutherford Appleton Laboratory (England) and the European Spallation Source project to allow joint research and development. A Working Group on Neutron Sources has been established under the Megascience Forum of the Organization for Economic Cooperation and Development.

BASIC ENERGY SCIENCES
PROGRAM FUNDING PROFILE
(Dollars in thousands)

	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Research					
Materials Sciences	$364,036	$364,571	$0	$364,571	$392,475
Chemical Sciences	200,045	202,099	0	202,099	199,933
Engineering and Geosciences	39,592	42,920	0	42,920	41,371
Energy Biosciences	28,730	28,585	0	28,585	27,461
Advanced Energy Projects	11,700	0	0	0	0
Applied Mathematical Sciences	111,068	0	0	0	0
Program Direction	9,176	0	0	0	0
Subtotal, Research	764,347	638,175	0	638,175	661,240
Construction	9,986	11,500	0	11,500	11,000 a/
Subtotal, Basic Energy Sciences	774,333	649,675	0	649,675	
Adjustment	-17,168 b/	-9,404 b/	0	-9,404 b/	
Total, Basic Energy Sciences	$757,165 c/	$640,271	$0	$640,271	

a/ Includes $11,000,000 for fully funding completion of the Combustion Research Facility, Phase II.

b/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction was applied at the appropriation level.

c/ Excludes $13,228,000 which was transferred to the SBIR program and $999,000 which was transferred to the STTR program.

Public Law Authorizations:

Public Law 95-91, DOE Organization Act

BASIC ENERGY SCIENCES
(Dollars in thousands)

PROGRAM FUNDING BY SITE

Field Offices/Sites	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Albuquerque Operations Office					
Los Alamos National Laboratory	$35,005	$19,894	$0	$19,894	$23,886
National Renewable Energy Laboratory	5,431	4,270	0	4,270	4,301
Sandia National Laboratories	28,265	29,546	0	29,546	31,821
Chicago Operations Office					
Ames Laboratory	23,135	17,830	0	17,830	17,843
Argonne National Laboratory	158,579	137,098	0	137,098	143,088
Brookhaven National Laboratory	83,623	74,229	0	74,229	79,281
Idaho Operations Office					
Idaho National Engineering Laboratory	3,454	2,758	0	2,758	2,744
Oakland Operations Office					
Lawrence Berkeley National Laboratory	112,235	61,564	0	61,564	62,323
Lawrence Livermore National Laboratory	2,450	6,094	0	6,094	4,731
Stanford Linear Accelerator Center	22,083	20,537	0	20,537	21,007
Oak Ridge Operations Office					
Oak Ridge Institute for Science and Education	1,121	746	0	746	701
Oak Ridge National Laboratory	99,693	87,549	0	87,549	105,382
Thomas Jefferson National Accelerator Facility	155	0	0	0	0
Richland Operations Office					
Pacific Northwest National Laboratory	13,063	12,304	0	12,304	12,377
All Other Sites a/	186,041	175,256	0	175,256	162,755
Subtotal	774,333	649,675	0	649,675	672,240
Adjustment	-17,168 b/	-9,404 b/	0	-9,404 b/	0
TOTAL	$757,165 c/	$640,271	$0	$640,271	$672,240

a/ Funding provided to universities, industry, other Federal agencies and other miscellaneous contractors.

b/ Share of Energy Supply Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction was applied at the appropriation level.

c/ Excludes $13,228,000 which was transferred to the SBIR program and $999,000 which was transferred to the STTR program.

I. **Mission Supporting Goals and Objectives**: The Materials Sciences Subprogram supports basic research in condensed matter physics, metallurgy, ceramics, and materials chemistry. This basic research seeks to understand the atomic-bases of materials properties and behavior and how to make materials perform better at acceptable cost through new methods of synthesis and processing. Basic research is supported in corrosion, metals, ceramics, alloys, semiconductors, superconductors, polymers, metallic glasses, ceramic matrix composites, non-destructive evaluation, magnetic materials, surface science, neutron and x-ray scattering, chemical and physical properties, and new instrumentation. Ultimately the research leads to the development of materials that improve the efficiency, economy, environmental acceptability, and safety in energy generation, conversion, transmission, and use. These material studies affect developments in numerous areas such as solar energy conversion, transportation, electric power production, and petroleum refining.

II. **Funding Schedule:**

Facility	FY 1996	FY 1997	FY 1998	$ Change	% Change
Materials Sciences Research	$173,307	$166,066	$192,922	$+26,856	+16.2%
Facilities Operations	190,729	182,281	190,665	+8,384	+4.6%
SBIR/STTR	0	8,800	8,888	+88	+1.0%
Congressional Direction	0	7,424	0	-7,424	-100.0%
Total, Materials Sciences	$364,036	$364,571	$392,475	$+27,904	+ 7.6%

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
Materials Sciences Research			
-Basic research is conducted on synthesis and processing; theory and modeling; structural characterization; and mechanical and physical behavior. The purpose of this research is to understand the synergistic relationship between the synthesis, processing, microscopic structure and the mechanical and physical behavior of materials. This research includes topics in lattice defects; diffusion and transport; magnetic, superconducting, semiconducting and alloy ordering behaviors; radiation damage; corrosion; deformation and fracture; and microstructural and microchemical characterizations by means of electron beams, neutron beams, and x-rays. Capital equipment is required for items such as high-temperature components for electron microscopes, atomic probes, crystals, x-ray detectors, spectrometers, tomographic instruments, and computer controls.	$67,980	$67,165	$68,829
-Basic research on the physical properties of materials, largely in the area of condensed matter physics, is conducted to determine the positions and movements of atoms in solids and liquids and the effects of these on the electronic states. This activity encompasses experiments in neutron and x-ray scattering; experiments to determine properties of solids, such as electrical and thermal conductivity, superconductivity, magnetism, and experiments on the effects of light and other radiation on materials. There are also theoretical investigations and computer simulations to gain understanding of the experiments and to model the behavior of materials. Capital equipment is required for items such as high field magnets, dilution refrigerators, neutron and x-ray spectrometers, detectors, energy filters, and magneto-optical instrumentations.	71,075	65,311	66,930

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
-Research on the chemical properties of materials is conducted to understand the effects of chemical reactivity on the behavior of materials and to synthesize new chemical compounds and structures from which better materials can be made. This activity includes research in solid state chemistry, surface chemistry, polymer chemistry, crystallography, synthetic chemistry, and colloid chemistry. Capital equipment is required for items such as spectrometers, reflectometers, computer workstations for simulations and modeling, and instrumentation to study surfaces at the atomic scale.	23,963	22,592	22,663
-The Experimental Program to Stimulate Competitive Research (EPSCoR) provides financial assistance to states that historically have received relatively less Federal research funding. BES EPSCoR funding is consolidated in the Materials Sciences subprogram in FY 1998. FY 1996 and FY 1997 EPSCoR funding is also included in all other Basic Energy Sciences subprograms. The EPSCoR program was included in the BES program at the direction of Congress in FY 1996.	2,654	3,330	7,000

BASIC ENERGY SCIENCES
MATERIALS SCIENCES

EPSCoR DISTRIBUTION OF FUNDS BY STATE
(Dollars in thousands)

	FY 1996 Actual	FY 1997 Estimate	FY 1998 Estimate
Alabama	$900	$725	$725
Kentucky	$925	$725	$725
Louisiana	$900	$725	$725
Maine	$925	$725	$725
Montana	$950	$725	$725
Nevada	$950	$725	$725
Puerto Rico	$925	$725	$725
South Carolina	----	$725	$725
Wyoming	----	$725	$725
Other*	$525	$475	$475
Totals	$7,000**	$7,000**	$7,000

* Technical support of Experimental Program to Stimulate Competitive Research (EPSCoR).

** FY 1996 and FY 1997 EPSCoR funding is also included in all other Basic Energy Sciences subprograms.

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
-Los Alamos Neutron Science Center (LANSCE) instrumentation enhancement. This project is a major item of equipment with a Total Estimated Cost of $20,500,000 that will provide enhanced instrumentation at the LANSCE and will be implemented concurrently with an accelerator upgrade funded by the Office of Defense Programs.	0	0	4,500
-Conceptual design of the National Spallation Neutron Source (NSNS) will be completed in FY 1997. FY 1998 funding of $23,000,000 is requested for pre-title I activities for the NSNS.	7,635	7,668	23,000
SUBTOTAL Materials Sciences Research	173,307	166,066	192,922
Facilities Operations			
-Operation of national user facilities. The facilities included in Materials Sciences are: National Synchrotron Light Source, High Flux Beam Reactor, Intense Pulsed Neutron Source, Stanford Synchrotron Radiation Laboratory, Manuel Lujan, Jr. Neutron Scattering Center, Advanced Light Source and Advanced Photon Source. The facility operations budget request, which includes operating funds, capital equipment, and AIP funding under $2,000,000, is described in a consolidated manner later in this budget. AIP funding will support additions and modifications to accelerator and reactor facilities which are supported in the Materials Sciences subprogram. Capital equipment is needed at the facilities for items such as beam monitors, interlock systems, vacuum systems, beamline front end components, monochromators, and power supplies. A summary table of the facilities included in the Materials Sciences subprogram is provided below.	190,729	182,281	190,665
SUBTOTAL Facilities Operations	$190,729	$182,281	$190,665

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
Facilities			
National Synchrotron Light Source	$22,880	$20,875	$22,487
High Flux Beam Reactor	26,339	23,955	25,383
Intense Pulsed Neutron Source	11,558	10,667	11,620
Stanford Synchrotron Radiation Laboratory	3,714	3,625	3,772
Manuel Lujan, Jr. Neutron Scattering Center	7,516	7,343	7,740
Advanced Light Source	31,888	32,868	34,971
Advanced Photon Source	83,061	81,441	84,692
Partial Offset to ESRD General Reduction Applied to BES	3,773	1,507	0
Total	$190,729	$182,281	$190,665
SBIR/STTR Funding	0	8,800	8,888
Congressional Direction	0	7,424	0
TOTAL Materials Sciences	$364,036	$364,571	$392,475

In FY 1996 $6,389,000 and $483,000 were transferred to the SBIR and STTR programs, respectively. The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only since Part D, Section 110 of P.L. 104-208, Making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.

Funds Rose Hulman Institute of Technology; Alabama Mineral Research Center, Tuscaloosa; and University of Alabama, Birmingham in FY 1997 (per Congressional direction). No additional funds were provided for these projects by the Congress in FY 1997.

BASIC ENERGY SCIENCES
MATERIALS SCIENCES

EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:

Increase provides capital equipment funding for the design and fabrication of instrumentation for the Short Pulse Spallation Source enhancement at LANSCE.	$+4,500,000
Restore funding in the areas of high temperature superconductivity, radiation effects, and high temperature structural ceramics.	$+3,354,000
Funding for the pre-title I design of the National Spallation Neutron Source (NSNS) is increased.	$+15,332,000
Funding for EPSCoR has been consolidated into the Materials Sciences subprogram.	$+3,670,000
Increase SBIR funding due to increase in operating expenses. No STTR funding requested in FY 1998.	$+ 88,000
Restores facility operations to the FY 1996 level. The level of funding decreased in FY 1997 as a result of Congressional direction without the additional funds.	$+8,384,000
Funding not needed in FY 1998 for FY 1997 projects included by Congress without funds.	$-7,424,000
Total Funding Change, Material Sciences	$+27,904,000

MAJOR ISSUES:

Neutron science is a critical tool in materials sciences and related disciplines that are crucial to the U.S. knowledge base for advanced technologies, particularly those related to energy technologies. The U.S. currently lags far behind both Europe and Japan in neutron science. Planned new neutron sources in Europe and Japan could increase their lead even further in materials science and related research using neutrons.

To maintain a strong U.S. position in the field of neutron science following the termination of the Advanced Neutron Source (ANS) project, the Department will support neutron source enhancements such as the Los Alamos Neutron Science Center (LANSCE) instrumentation enhancement in this request. In addition, funding for Pre-title I design efforts for the National Spallation Neutron Source is requested in FY 1998. A request for NSNS Title-I funding is anticipated in FY 1999.

BASIC ENERGY SCIENCES

CHEMICAL SCIENCES

I. **Mission Supporting Goals and Objectives**: The Chemical Sciences Subprogram has two major components. The disciplinary areas within each component are connected to and address needs of the principal DOE mission goals and objectives. One major component is comprised of atomic, molecular and optical physics; chemical physics; photochemistry; and radiation chemistry. This research provides a foundation for understanding fundamental interactions of atoms, molecules, and ions with photons and electrons. This work also underpins our fundamental understanding of chemical reactivity. This, in turn, enables the production of more efficient combustion systems with reduced emissions of pollutants. It also increases knowledge of solar photoconversion processes resulting in new, improved systems and production methods. Completely unanticipated benefits from this research often result. For example, research supported by the Chemical Science subprogram on small atomic clusters led to the discovery of the new forms of carbon named the fullerenes, typified by C_{60} (buckminsterfullerene). The 1996 Nobel Prize in chemistry was awarded to the scientists who made this discovery. The other major component of the research program is comprised of inorganic chemistry, organic chemistry, analytical chemistry, separations science, heavy element chemistry, and aspects of chemical engineering sciences. The research supported provides a better molecular level understanding of homogeneous and heterogeneous reactions occurring at surfaces, interfaces, and in bulk media. This has resulted in improvements to known heterogeneous and homogeneous catalytic systems and to new catalysts for the production of fuels and chemicals; better analytical methods with a wide variety of applications in energy processes and environmental sciences; new knowledge of actinide elements and separations important for environmental remediation and waste management; and better methods for describing turbulent combustion and predicting thermophysical properties of multicomponent systems.

II. **Funding Schedule:**

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Chemical Sciences Research	$130,888	$128,339	$130,308	$ +1,969	+1.5%
Facilities Operations	69,157	63,711	65,363	+1,652	+2.6%
SBIR/STTR	0	4,555	4,262	-293	-6.4%
Congressional Direction	0	5,494	0	-5,494	-100.0%
Total, Chemical Sciences	$200,045	$202,099	$199,933	$-2,166	-1.1%

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
Chemical Sciences Research			
-The program supports experimental and theoretical research devoted to study of atoms, molecules, ions and light and their interactions--areas that may have broad fundamental impact on much of chemistry. Molecular processes related to combustion of fossil fuels and catalysis as well as the conversion of solar energy to other useful energy forms are also studied. Recent accomplishments include new insights on electron transfer processes in artificial photosynthetic systems; improved theoretical understanding of simple combustion reactions; the development of several new techniques for thermochemical determinations, a new method to follow the dynamics of simple collision processes, and a new form of atomic spectroscopy. Capital equipment is required for such items as mass spectrometers, electronic waveform digitizers, oscilloscopes, detection equipment, optical spectrometers, and vacuum equipment. AIP funding is also required for additions and modifications to accelerator and reactor facilities supported by the Chemical Sciences subprogram. The total estimated cost of each AIP project will not exceed $2,000,000. The Chemical Sciences subprogram also provides General Purpose Equipment (GPE) and General Plant Projects (GPP) funds, for minor new construction, for other capital alterations and additions, and for improvements to land, buildings, and utility systems at the Ames Laboratory, Argonne National Laboratory, and Oak Ridge National Laboratory as part of Basic Energy Sciences' landlord responsibilities for these laboratories. Funding of this type is essential for maintaining the productivity and usefulness of	$69,684	$65,670	$68,931

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
Department-owned facilities and in meeting its requirement for safe and reliable facilities operation. The toal estimated cost of each GPP project will not exceed $2,000,000.			
-The program supports a broad, well-integrated continuum of effort that uses atomic and molecular level information to understand homogeneous and heterogeneous catalysis as well as separations and analysis methodologies including studies of the actinide elements. Certain engineering areas are also supported such as turbulence related to combustion and thermodynamics. Recent accomplishments include finding a safe non-incinerative technique for removal of fluorocarbons, a new catalytic route for converting small alkane molecules into high-value liquid fuels, and improved understanding of the structure and properties of supercritical water. Capital equipment is required for such items as high resolution area detectors, catalytic reactors, analytical instrumentation, lasers, and optical spectrometers.	59,354	60,359	61,377
-The Experimental Program to Stimulate Competitive Research (EPSCoR) is being consolidated in the Materials Sciences subprogram in FY 1998.	1,850	2,310	0
Total Chemical Sciences Research	$130,888	$128,339	$130,308

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
Facilities Operations			
-Operation of national user facilities. The facilities included in Chemical Sciences are: National Synchrotron Light Source, High Flux Isotope Reactor, Radiochemical Engineering Development Center, Stanford Synchrotron Radiation Laboratory, and Combustion Research Facility. The facility operations budget request, which includes operating funds, capital equipment, general plant projects, and AIP funding under $2,000,000, is described in a consolidated manner later in this budget. AIP funding will support additions and modifications to accelerator and reactor facilities which are supported in the Chemical Sciences subprogram. General Plant Project (GPP) funding is also required for minor new construction, for other capital alterations and additions, and for improvements to land, buildings, and utility systems. The total estimated cost of each GPP project will not exceed $2,000,000. Capital equipment is needed for the facilities for items such as beam monitors, interlock systems, vacuum systems, beamline front end components, monochromators, and power supplies. A summary table of the facilities included in this Chemical Sciences subprogram is provided below.	69,157	63,711	65,363
Total Facilities Operations	$69,157	$63,711	$65,363

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
Facilities			
National Synchrotron Light Source	7,853	7,429	8,113
High Flux Isotope Reactor	28,204	27,218	27,761
Radiochemical Engineering Development Center	7,078	6,705	7,127
Stanford Synchrotron Radiation Laboratory	18,169	16,902	17,228
Combustion Research Facility	5,411	4,921	5,134
Advanced Photon Source (GPP only)*	1,100	0	0
Partial Offset to ESRD General Reduction Applied to BES	1,342	536	0
Total	69,157	63,711	65,363

*Funding for General Plant Projects only; APS operations funded in Material Sciences as displayed previously.

SBIR/STTR Funding	0	4,555	4,262

In FY 1996 $3,421,000 and $258,000 were transferred to the SBIR and STTR programs, respectively. The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only, since Part D, Section 110 of P.L. 104-208, Making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.

Total SBIR/STTR Funding	$0	$4,555	$4,262

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
Congressional Direction	0	5,494	0
Funds Rose-Hulman Institute of Technology; Alabama Mineral Research Center, Tuscaloosa; and University of Alabama, Birmingham in FY 1997 (per Congressional direction). No additional funds were provided for these projects by the Congress in FY 1997.			
Total Congressional Direction	$0	$5,494	$0
Total Chemical Sciences	$200.045	$202.099	$199.933

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

Funding for EPSCoR has been consolidated into the Materials Sciences subprogram.	$ -2,310,000
Restore funding for research in organic chemistry related to coal conversion.	$+4,279,000
SBIR/STTR funding reduced because no STTR funding is requested in FY 1998.	$ -293,000
Restores facility operations to the FY 1996 level. The level of funding decreased in FY 1997 as a result of Congressional Direction without the additional funds.	$+1,652,000
Funding not needed in FY 1998 for FY 1997 projects included by Congress without funds.	$-5,494,000
Total Funding Change, Chemical Sciences	$-2,166,000

BASIC ENERGY SCIENCES

ENGINEERING AND GEOSCIENCES

I. **Mission Supporting Goals and Objectives**: The Engineering and Geosciences Subprogram conducts research in two disciplinary areas, Engineering and Geosciences. In Engineering Research, the goals are to extend the body of knowledge underlying current engineering practice to create new options for improving energy efficiency and to broaden the technical and conceptual knowledge base for solving the engineering problems of energy technologies. In Geosciences Research, the goal is on fundamental knowledge of the processes that transport, concentrate, emplace, and modify the energy and mineral resources and the byproducts of energy production. The research supports existing energy technologies and strengthens the foundation for the development of future energy technologies. Ultimately the research impacts control of industrial processes to improve efficiency and reduce pollution, to increase energy supplies, and to lower cost and increase the effectiveness environmental remediation of polluted sites.

II. **Funding Schedule**

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Engineering Research	$ 18,001	$17,040	$16,889	$ -151	-0.9%
Geosciences Research	21,591	22,013	23,489	+1,476	+6.7%
SBIR/STTR	0	1,093	993	-100	-9.1%
Congressional Direction	0	2,774	0	-2,774	-100.0%
Total, Engineering and Geosciences	$39,592	$42,920	$41,371	$-1,549	-3.6%

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
Engineering Research -The Engineering Research program supports basic research in selected areas to provide the fundamental scientific base necessary for current engineering practice and to broaden the technical and conceptual base for solving future engineering problems in the energy technologies. Recent accomplishments include advancing basic knowledge of fluid flow for understanding flow in natural and manmade structures (i.e., pipelines), progress in understanding how fracture and fatigue arise in stressed energy structures for early detection and prevention of structure failure, chemical process control to improve production efficiency, instrumentation for environmental sensors, improved understanding of chaotic systems bearing on industrial scale mixing methods, principles underlying environmentally benign manufacturing methods, and continuing support for graduate training fellowships in environmentally sustainable manufacturing. Capital equipment is required for items such as instrumentation and diagnostics for experiments on: the control of plasma processing of materials and fracture and fatigue in stressed structures.	$17,711	$16,680	$16,889
-The Experimental Program to Stimulate Competitive Research (EPSCoR) is being consolidated in the Materials Sciences subprogram in FY 1998.	290	360	0
SUBTOTAL Engineering Research	$18,001	$17,040	$16,889

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
Geosciences Research			
-The Geosciences Research program supports basic research to improve the level of understanding necessary for advances in, and choices among, current and emerging energy and environmental technologies. Recent accomplishments include increasing the level of fundamental understanding of mineral-fluid interactions to provide a better foundation for oil, gas, and geothermal resource recovery and control of contaminants in groundwater flow; advances in geophysical imaging and interpretation to provide new windows on subsurface structure and properties in the context of energy and environmental technologies; new fundamental thermodynamic and physical property information on rocks, minerals, and geologic fluids for research recovery and contaminant control; and extending the applicability of isotopic tracer methods for evaluation of natural and human-perturbed processes in the geologic environment. Capital equipment is required for laboratory and in-situ studies of geologic systems, including facilities for microanalysis (e.g., synchrotron based methods) and facilities for characterizing the thermo-mechanical and transport behavior of rocks.	$21,251	$21,593	$23,489
-The Experimental Program to Stimulate Competitive Research (EPSCoR) is being consolidated in the Materials Sciences subprogram in FY 1998.	340	420	0
SUBTOTAL Geosciences Research	$21,591	$22,013	$23,489

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
SBIR/STTR Funding	$ 0	$ 1,093	$ 993
In FY 1996 $749,000 and $57,000 were transferred to the SBIR and STTR programs, respectively. The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only, since Part D, Section 110 of P.L. 104-208, Making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.			
Congressional Direction Funds Rose-Hulman Institute of Technology; Alabama Mineral Research Center, Tuscaloosa; and University of Alabama, Birmingham in FY 1997 (per Congressional direction). No additional funds were provided for these projects by the Congress in FY 1997.	$ 0	$ 2,774	$ 0
TOTAL Engineering and Geosciences	$39,592	$42,920	$41,371

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

There will be a restoration in the level of effort in fluid mechanics research, chemical process control, combustion and data collection.	$+209,000
There will be restoration in support in projects related to fundamental properties of geologic materials and geophysical imaging and interpretation.	$+1,896,000
SBIR/STTR: Reduce SBIR funding due to decrease in operating expenses. No STTR funding requested in FY 1998.	$-100,000

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998: (cont'd)

EPSCoR: Funding for EPSCoR has been consolidated into the Materials Sciences subprogram.	$-780,000
Congressional Direction: Funding not needed in FY 1998 for FY 1997 projects included by Congress without funds.	$-2,774,000
Total Funding Change, Engineering and Geosciences	$-1,549,000

BASIC ENERGY SCIENCES
ADVANCED ENERGY PROJECTS

I. **Mission Supporting Goals and Objectives**: This subprogram was transferred to the Computational and Technology Research Program in FY 1997. This activity funds research to establish the feasibility of novel, energy-related concepts that span the Department's energy mission and goals. These concepts are usually derived from recent advances in basic research, but require additional research to establish their feasibility. A common theme for each concept is the initial linkage of new, or previously neglected, research results to a practical energy payoff for the Nation. Efforts are typically supported at a level of $300,000 per year for a period of 3 years. Although the funding profile can vary widely among projects in the Advanced Energy Projects (AEP) research portfolio, the 3-year budget period is considered a maximum. A measure of success is demonstrated if the project attains further funding from another source to realize its full potential. Projects are selected from proposals submitted by universities, industrial organizations, non-profit research institutions, and national laboratories. Equal consideration is given to each submission. Funding criteria include scientific merit as judged by peer review.

II. **Funding Schedule**:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Advanced Energy Projects	$ 11,700	$ 0	$ 0	$ 0	--
Total, Advanced Energy Projects	$ 11,700	$ 0	$ 0	$ 0	--

III. **Performance Summary- Accomplishments:**

	FY 1996	FY 1997	FY 1998
-Projects supported involved novel, interdisciplinary research ideas that fell outside ongoing discipline-oriented DOE subprograms, and addressed potentially significant energy or environmental benefits. Projects supported in FY 1996 included: the application of novel materials to a high efficiency, CFC-Free refrigeration technique, and exploration of the feasibility of electrically controlled thin films for windows with adjustable tint. Approximately 40 projects are supported.	11,512	0	0

BASIC ENERGY SCIENCES
ADVANCED ENERGY PROJECTS

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
-The Experimental Program to Stimulate Competitive Research (EPSCoR) is being consolidated in the Materials Sciences subprogram in FY 1998.	$188	$0	$0
SBIR/STTR Funding	0	0	0
In FY 1996 $221,000 and $17,000 were transferred to the SBIR and STTR programs, respectively.			
TOTAL Advanced Energy Projects	$11,700	$ 0	$ 0

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

This subprogram is funded in the Computational and Technology Research program beginning in FY 1997.

BASIC ENERGY SCIENCES

ENERGY BIOSCIENCES

I. **Mission Supporting Goals and Objectives:** The Energy Biosciences subprogram supports research to provide a basic understanding of the biological phenomena associated with the capture, transformation, storage and utilization of energy. The research on plants and non-medical microorganisms focuses on a range of biological processes including photosynthesis, bioenergetics, primary and secondary metabolism, the synthesis and degradation of biopolymers such as lignin and cellulose, anaerobic fermentations, genetic regulation of growth and development, thermophily, e.g., bacterial growth under high temperature, and other phenomena with the potential to impact biological energy production and conversion. The research supported is fundamental and is selected to broadly support Department of Energy's goals and objectives in energy production, environmental management, and energy conservation.

II. **Funding Schedule:**

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Energy Biosciences	$28,730	$26,980	$26,784	$ -196	-0.7%
SBIR/STTR	0	747	677	-70	-9.4%
Congressional Direction	0	858	0	-858	-100.0%
Total	$28,730	$28,585	$27,461	$-1,124	-3.9%

III. **Performance Summary- Accomplishments:**

	FY 1996	FY 1997	FY 1998
-The Energy Biosciences Program supports a broad research portfolio of molecular and mechanistic research in the microbial and plant sciences. Accomplishments include the recent initiation of the multi-agency, multinational sequencing of critical sections of the genetic material from the model plant, *Arabidopsis thaliana*. Efforts to increase the understanding of the molecular interactions between microbial systems and geologic components critical in environmental restoration and the biological modification of inorganic materials are continuing. Research efforts to determine the mechanisms of plant tissue development are being enhanced to	28,266	26,400	26,784

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
more fully understand the formation of the tissues involved in energy storage. Research efforts on the biochemistry and physiology of microbes with the potential for energy use are continuing with special emphasis on the field of microbial physiology, a subdiscipline that is critical to scaling up and deploying new biotechnologies in an industrial setting (e.g., fermentation, pharmaceutical and chemical industries). Capital equipment is required for items such as confocal microscopes, radio-high pressure liquid chromatography detectors, photon counting and imaging systems, pulsed field gel electrophoresis, and microplate readers needed in advanced molecular genetics research.			
-The Experimental Program to Stimulate Competitive Research (EPSCoR) is being consolidated in the Materials Sciences subprogram in FY 1998.	464	580	0
SBIR/STTR Funding	0	747	677

In FY 1996 $551,000 and $41,000 were transferred to the SBIR and STTR programs respectively. The FY 1997 estimate is for both SBIR only. The FY 1998 estimate is for SBIR only, since Part D, Section 110 of P.L. 104-208, Making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
Congressional Direction	$0	$858	$0
Funds Rose-Hulman Institute of Technology; Alabama Mineral Research Center, Tuscaloosa; and University of Alabama, Birmingham in FY 1997 (per Congressional direction). No additional funds were provided for these projects by the Congress in FY 1997.			
TOTAL Energy Biosciences	$28,730	$28,585	$27,461

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

There will be a restoration in funding of studies of the molecular mechanisms of plant and plant pathogen interactions as well as in the description of the molecular genetic regulatory strategies developed by plants.	$+384,000
Funding for EPSCoR has been consolidated into the Materials Sciences subprogram.	$-580,000
Reduce SBIR funding due to decrease in operating expenses. No STTR funding requested in FY 1998.	$-70,000
Funding not needed in FY 1998 for FY 1997 projects included by Congress without funds.	$-858,000
Total Funding Change, Energy Biosciences	$-1,124,000

BASIC ENERGY SCIENCES

APPLIED MATHEMATICAL SCIENCES (AMS)

I. **Mission Supporting Goals and Objectives**: The Applied Mathematical Sciences (AMS) subprogram is a forefront, diverse applied mathematical sciences, high performance computing, communications and information infrastructure program that spans the spectrum of activities from strategic fundamental research to technology development and demonstration. The diverse activities supported by this program are integrated to support two major strategic thrusts: National Collaboratories (NC) and Advanced Computational Testing and Simulation (ACTS). The thrust in National Collaboratories is developing a set of tools and capabilities that will permit scientists and engineers working at different DOE and other facilities to collaborate on solving problems as easily as if they were in the same location. The thrust in Advanced Computational Testing and Simulation is developing an integrated set of algorithms, software tools and infrastructure that will enable computer simulation to better complement experiment and theory or to be used in place of experiments when real experiments are too dangerous, expensive, or inaccessible. These two strategic thrusts support the underlying mathematical concepts and information technology needs of all DOE mission areas (e.g., Fundamental Research, Defense, Energy Efficiency, Environmental and Fossil programs, etc.). The efforts in these areas are closely coordinated with related activities supported by Defense Programs.

The AMS subprogram also supports and responds to the Energy Policy Act (EPACT) and to the High Performance Computing Act of 1991 and provides supercomputer access and advanced communication capabilities, through the National Energy Research Scientific Computing (NERSC) and the Energy Sciences Network (ESnet), to scientific researchers. Finally, the AMS subprogram also serves as an advocate within the Department to formulate and coordinate the Department's National Information Infrastructure (NII) initiative, especially to promote economically beneficial energy-related "National Challenges" applications such as energy demand and supply management and to develop the underlying technologies to enable these applications. This subprogram is transferred to the Computational and Technology Research program in FY 1997.

II. **Funding Schedule:**

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Mathematical, Computational, and Computer Sciences Research...	$ 49,431	$ 0	$ 0	$ 0	----
Advanced Computation, Communications, and Associated Activities.	61,637	0	0	0	----
Total	$ 111,068	$ 0	$ 0	$ 0	----

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
-Research supporting advanced computational testing and simulation including applied mathematics research, computer science and software tools research, grand challenge applications, and computational science education programs. Capital equipment supporting research in advanced computational testing and simulation including computers, storage devices, and other peripheral equipment.	$48,217	$ 0	$ 0
The Experimental Program to stimulate Competitive Research (EPSCoR) is being consolidated in the Materials Sciences subprogram.	1,214	0	0
SUBTOTAL Mathematical, Computational, and Computer Sciences Research	$49,431	$ 0	$ 0
Advanced Computation, Communications, and Associated Activities			
- Research in support of National Collaborators: high capability, networks information surety, underlying technologies to support national collaborators, and underlying technologies to support electricity supply and demand management.	$ 8,377	$ 0	$ 0

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
-Operations of the National Energy Research Scientific Computing (NERSC) Center, which provides high performance computing for investigators supported by the Office of Energy Research. The Center serves more than 4,000 users working on about 700 projects, of which about 35% are university based, 60% are in National Laboratories, and 5% in industry. NERSC operates a spectrum of supercomputers that provides a range of high performance computing resources that are a critical element in the success of many ER research programs. These computational resources are integrated together by a common high performance file storage system which facilitates interdisciplinary collaborations. Related capital equipment needs are also supported.	26,909	0	0
-Support for ESnet operations which provide worldwide access to Energy Research facilities, including: advanced light sources, neutron sources, particle accelerators, fusion reactors, spectrometers, high performance computing resource providers (HPCRP), and other leading-edge science instruments and facilities. Future upgrades will allow for remote experimentation and "virtual laboratory" access to these facilities, as complementary National Collaboratory technologies are developed. Related capital equipment needs are also supported.	13,965	0	0

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
-High Performance Computing Resource Providers which provide the needed leading edge computational hardware testbeds to support grand challenge and advanced computational testing and simulation research.	12,386	0	0
SUBTOTAL Advanced Computation, Communications, & Associated Activities	$61,637	$ 0	$ 0
SBIR/STTR Funding	0	0	0
In FY 1996 $1,897,000 and $143,000 were transferred to the SBIR STTR programs, respectively.			
TOTAL Applied Mathematical Sciences	$111,068	$ 0	$ 0

EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:

This subprogram is funded in the Computational and Technology Research program beginning in FY 1997.

BASIC ENERGY SCIENCES

PROGRAM DIRECTION

I. **Mission Supporting Goals/Ongoing Objectives:** This subprogram was transferred to the new Energy Research Energy Supply Research and Development Program Direction decision unit in FY 1997 at the direction of Congress. Program Direction provides the Federal staffing resources and associated funding required to develop, direct, and administer a complex and broadly diversified program of mission-oriented research, including the construction and operation of scientific user facilities, for the scientific and engineering community. The Nation's future energy, defense, and technology options depend on long-range research supported by this program. This staff administers a basic research program which helps us attain our national goals, i.e., better health and quality of life, economic competitiveness, energy self-sufficiency, and national security. The staff annually monitors and evaluates approximately 1,400 individual research projects at over 200 separate institutions.

Staff include scientific and technical personnel and program management support in the areas of budget and finance, personnel administration, grants and contracts, information resource management, policy review and coordination, and construction management.

II. **Funding Schedule:**

Activity	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustment	FY 1997 Current Appropriation	FY 1998 Budget Request
Salaries and Benefits	$ 7,893	$ 0	$ 0	$ 0	$ 0
Travel	300	0	0	0	0
Support Services	782	0	0	0	0
Other Related Expenses	201	0	0	0	0
Total	$ 9,176	$ 0	$ 0	$ 0	$ 0
Full-time Equivalents	85	0	0	0	0

III. Performance Summary	FY 1996	FY 1997	FY 1998
Salaries and Benefits: Funded staff managing and supporting the Basic Energy Sciences program with reduced staffing levels as a result of streamlining efforts.	$7,893	$0	$0
Travel: Provided on-site contractor and facility oversight and participated in major scientific conferences to maintain state-of-the-art scientific expertise.	$300	$0	$0
Support Services: Provided computer system development, environment, health, and safety, and administrative support for the Basic Energy Sciences program.	$782	$0	$0
Other Related Expenses: Provided hardware and software for information technology improvements and other miscellaneous costs of supporting the program.	$201	$0	$0
Total	$9,176	$0	$0

EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998

This program was transferred to the new Energy Supply Research and Development Program Direction account in FY 1997 at the direction of Congress.

Support Services	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Technical Support Service				
Feasibility of Design Considerations				
Economic and Environmental Analysis	270			
Test and Evaluation Studies				
Subtotal	270			
Management Support Services				
Management Studies				
Training and Education	30			
ADP Support	392			
Administrative Support Services	90			
Subtotal	512			
Total Support Services	782			
Use of Prior Year Balances				

Other Related Expenses	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Training				
Working Capital Fund				
Printing and Reproduction				
Rental Space				
Software Procurement/Maintenance Activities/Capital Acquisitions	150			
Other	50			
Total Obligational Authority	201			
Use of Prior-Year Balances				
Total Budget Authority	201			

BASIC ENERGY SCIENCES

CONSTRUCTION

I. **Mission Supporting Goals and Objectives**: Construction is needed to support the research in each of the subprograms in the Basic Energy Sciences program. Experiments necessary in support of basic research require that state-of-the-art facilities be built or existing facilities modified to meet unique research requirements. Reactors, radiation sources, and neutron sources are among the expensive, but necessary, facilities required. The budget for the BES program includes funding for the construction and modification of these facilities.

II. **Funding Schedule:**

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Construction	$ 9,986	$ 11,500	$ 11,000	$ -500	- 4.4%
Total	$ 9,986	$ 11,500	$ 11,000	$ -500	- 4.4%

III. **Performance Summary- Accomplishments:**

	FY 1996	FY 1997	FY 1998
-Completed the Advanced Photon Source consistent with the approved schedule.	$ 3,186	$ 0	$ 0
-Provide the full funding to complete the Combustion Research Facility, Phase II project.	2,000	9,000	11,000
-Funding for Accelerator and Reactor Improvements and Modifications in excess of $2,000,000 is provided for a liquid hydrogen cold source at the High Flux Isotope Reactor ($2,500,000) and an insertion device at the Advanced Light Source ($2,300,000) in FY 1996, and for construction of the Accelerator and Reactor Improvement (AIP) liquid hydrogen cold source project at the High Flux Isotope Reactor ($2,500,000) in FY 1997.	4,800	2,500	0
TOTAL Construction	$ 9,986	$11,500	$ 11,000

BASIC ENERGY SCIENCES
CONSTRUCTION

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

Increase to provide full funding for construction of CRF, Phase II.	$+2,000,000
Completion of AIP project at ORNL.	$-2,500,000
Total Funding Change, Construction	$ -500,000

BASIC ENERGY SCIENCES

MAJOR USER FACILITIES

I. **Mission Supporting Goals and Objectives**: The BES scientific user facilities provide experimental capabilities that are beyond the scope of those found in laboratories of individual investigators. Synchrotron radiation light sources, high-flux neutron sources, electron beam microcharacterization centers, and other specialized facilities enable scientists to carry out experiments that could not be done elsewhere. These seventeen facilities are part of the Department's system of scientific user facilities, the largest of its kind in the world.

The facilities are planned in collaboration with the scientific community and are constructed and operated by BES for support of forefront research in areas important to BES activities and also in areas that extend beyond the scope of BES activities such as structural biology, medical imaging, and micro machining. These facilities are used by researchers in materials sciences, chemical sciences, earth and geosciences, environmental sciences, structural biology, superconductor technology, and medical research and technology development. The facilities are open to all qualified scientists from academia, industry, and the federal laboratory system whose intention is to publish in the open literature.

II. **Funding Schedule:**

Funding for operation of these facilities is provided in the Materials Sciences and Chemical Sciences subprograms.

Facilities	FY 1996	FY 1997	FY 1998	$ Change	% Change
National Synchrotron Light Source	$30,733	$28,304	$30,600	$ +2,296	+8.1%
High Flux Beam Reactor	26,339	23,955	25,383	+1,428	+6.0%
Intense Pulsed Neutron Source	11,558	10,667	11,620	+953	+8.9%
High Flux Isotope Reactor	28,204	27,218	27,761	+543	+2.0%
Radiochemical Engineering Development Center	7,078	6,705	7,127	+422	+6.3%
Stanford Synchrotron Radiation Laboratory	21,883	20,527	21,000	+473	+2.3%
Manuel Lujan, Jr. Neutron Scattering Center	7,516	7,343	7,740	+397	+5.4%
Combustion Research Facility	5,411	4,921	5,134	+213	+4.3%
Advanced Light Source	31,888	32,868	34,971	+2,103	+6.4%
Advanced Photon Source	84,161	81,441	84,692	+3,251	+4.0%
Partial Offset to ESRD General Reduction Applied To BES	5,115	2,043	0	-2,043	-100.0%
Total	$259,886	$245,992	$256,028	$ +10,036	+4.1%

III. Performance Summary- Accomplishments:

	FY 1996	FY 1997	FY 1998
It will be noted that the requested funding for each facility in FY 1998 is, in general, at or below the level of the FY 1996 funding. Therefore, it can be expected that there will be some attenuation of operating time and user support due to the increase in the cost of living from FY 1996 to FY 1998. The level of funding decreased in FY 1997 for almost all the facilities as a result of Congressional Direction in the BES program without the addition of funds. These reductions are restored in FY 1998.			
-National Synchrotron Light Source at Brookhaven National Laboratory: This synchrotron provides 79 experimental stations for research using visible, ultraviolet light, and x-rays.	$30,733	$28,304	$30,600
-High Flux Beam Reactor at Brookhaven National Laboratory: This high-flux reactor operates at 30 megawatts to provide neutrons for 9 beam tubes and 16 instruments.	26,339	23,955	25,383
-Intense Pulsed Neutron Source at Argonne National Laboratory: This pulsed spallation neutron source operates at 6.7 kilowatts with 12 instruments.	11,558	10,667	11,620
-High Flux Isotope Reactor at Oak Ridge National Laboratory: This high-flux reactor operates at 85 megawatts primarily to provide isotopes and also has 4 beam tubes with 9 instruments for neutron scattering. There will be increased operating support to take advantage of the new cold source with 3 new experimental stations.	28,204	27,218	27,761
-Radiochemical Engineering Development Center at Oak Ridge National Laboratory: This facility is used to process the isotopes produced in the High Flux Isotope Reactor.	7,078	6,705	7,127

BASIC ENERGY SCIENCES
MAJOR USER FACILITIES

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
-Stanford Synchrotron Radiation Laboratory at Stanford University: This synchrotron provides 22 experimental stations for x-ray scattering research with an additional 4 stations under construction.	21,883	20,527	21,000
-Manuel Lujan, Jr. Neutron Scattering Center at Los Alamos National Laboratory: This pulsed spallation neutron source operates at 60 kilowatts with 7 instruments for neutron scattering and is part of the Los Alamos Neutron Science Center, a facility supported jointly by the Office of Basic Energy Sciences and the Office of Defense programs. Beginning in FY 1998, an additional 7 neutron scattering instruments will be added to accommodate more users with new capabilities.	7,516	7,343	7,740
-Combustion Research Facility at Sandia National Laboratories/ California: This facility provides lasers for research in chemical dynamics and spectroscopy.	5,411	4,921	5,134
-Advanced Light Source at Lawrence Berkeley National Laboratory: This new, third-generation synchrotron light source provides high-brilliance visible and ultra-violet light and low energy x-rays to 22 experimental stations including 4 that are under construction.	31,888	32,868	34,971
-Advanced Photon Source: This new, third-generation synchrotron light source provides high-energy x-rays to at least 20 experimental stations with more under construction.	84,161	81,441	84,692
-Partial Offset to ESRD General Reduction Applied to BES	5,115	2,043	0
TOTAL Major User Facilities	$259,886	$245,992	$256,028

BASIC ENERGY SCIENCES
CAPITAL OPERATING EXPENSES AND CONSTRUCTION SUMMARY
(Dollars in thousands)

Capital Operating Expenses	FY 1996	FY 1997	FY 1998	$ Change	% Change
General Plant Projects (total)	$9,089	$9,275	$9,275	$0	--
AIP under $2 million (total)	7,220	9,840	9,840	0	--
Capital Equipment (total)	77,682	45,695	49,372	3,677	+8.0%

Construction Project Summary (both Operating and Construction Funded)

Project No.	Project Title	TEC	Previous Appropriated	FY 1996 Appropriated	FY 1997 Request	FY 1998 Congressional Request
96-E-305	Accelerator and Reactor Improvements & Modifications, Various Locations	$4,800	$0	$4,800	$0	$0
97-E-305	Accelerator and Reactor Improvements & Modifications, Various Locations	2,500	0	0	2,500	0
96-E-300	Combustion Research Facility, Phase II, SNL	26,800	4,800	2,000	9,000	11,000
89-R-402	6-7 GeV Synchrotron Radiation Source, ANL	467,178	463,992	3,186	0	0
Total Basic Energy Sciences		XXXXXXX	$468,792	$9,986	$11,500	$11,000

Detailed Breakouts	Total CDR Cost	Previous Appropriated	FY 1996 Appropriated	FY 1997 Request	FY 1998 Congressional Request
CDR's - Exceeding $3 million					
1. National Spallation Neutron Source	$15,303	$0	$7,635	$7,668	$0
Bridge Costs - Exceeding $3 million					
1. National Spallation Neutron Source		$0	$0	$0	$23,000

Major Items of Equipment (CE $2 million and above)	TEC	Previous Appropriated	FY 1996 Appropriated	FY 1997 Request	FY 1998 Congressional Request	Acceptance Date
1. Machine Room Aux. Services & Network, LBNL	$2,000	$0	$2,000	$0	$0	Apr-1996
2. Data Storage Systems at NERSC - LBNL	2,000	0	2,000	0	0	Mar-1996
3. Short Pulse Spallation Upgrade at LANSCE - LANL	20,500	0	0	0	4,500	Sept-2001

DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST
(Changes from FY 1997 Congressional Budget Requested are denoted with a vertical line in left margin)

(Tabular dollars in thousands. Narrative material in whole dollars.)

Basic Energy Sciences

1.	Title and Location of Project:	Combustion Research Facility, Phase II Sandia National Laboratories Livermore, California	2a. 2b.	Project No. 96-E-300 Construction Funded
3a.	Date A-E Work Initiated, (Title I Design Start Scheduled): 1st Qtr., FY 1988		5.	Previous Cost Estimate: Total Estimated Cost (TEC) -- None
3b.	A-E Work (Titles I & II) Duration : 12 months			Total Project Cost (TPC) -- None
4a.	Date Physical Construction Starts: 4th Qtr., FY 1988		6.	Current Cost Estimate: TEC -- $26,800
4b.	Date Construction Ends: 4th Qtr., FY 1999			TPC -- $30,020

7. Financial Schedule: (Federal Funds)

Fiscal Year	Appropriation	Obligations	Costs
Prior Years a/	$ 4,800	$ 4,800	$ 4,205
1995	0	0	4
1996	2,000	2,000	685
1997	9,000	9,000	6,740
1998	11,000	7,000	8,476
1999	0	4,000	6,690

a/ Prior year funds transferred from 87-R-405.

1.	Title and Location of Project:	Combustion Research Facility, Phase II Sandia National Laboratories Livermore, California	2a. 2b.	Project No. 96-E-300 Construction Funded

8. Project Description, Justification and Scope

Phase II of the Combustion Research Facility (CRF) will add approximately 32,300 gross square feet to the existing 51,100 square-foot multibuilding CRF facility (Project No. 78-13-B, TEC $9,400,000) at Sandia National Laboratories, Livermore (SNL/L). Phase II will add 21,200 square feet to the existing 16,400 square-foot laboratory building and 11,100 square feet to the existing 25,000 square-foot office building. The project will include such site modifications and improvements as yard paving, walkways, landscaping, fencing, signage, and east entrance road relocation.

The project has been delayed due to budget constraints from FY 1989 through FY 1995. The appropriations totaling $4,800,000 in FY 1987 and FY 1988 were used for site preparation and design and construction of the shell of the laboratory building addition. The appropriations in FY 1996-FY 1998 will complete the balance of the project.

The laboratory building addition will be an L-shaped extension to the south and east of the existing building. Construction of the addition will match the existing building in architectural style, materials, and finishes, color, and floor-to-floor heights. The laboratory building addition will provide sixteen new laboratory spaces and two facility laser laboratories. The new facility laser rooms will be connected to serve any Lab in the facility, via the Laser Duct and Periscope System.

Once-through conditioned ventilation will be provided from existing building fans for existing and new laboratory spaces to carry off fuel gases or vapors and products of combustion, with systems included to minimize the discharge of contaminants to the atmosphere. An electronic safety monitoring and control system will provide back-up to the ventilation system.

The existing system of ducts used for diagnostic laser beam transmission from the central laser rooms will be extended to all new laboratories. Other existing building systems such as power distribution, lighting, communications, security alarms, fire and evacuation alarms, automatic fire sprinkler, and piping and plumbing will also be extended to the addition.

The office building addition will provide space for thirty-four new offices, an open office secretarial and file area, computer terminal rooms, and conference rooms. The addition will be a two-story wing added to the north of the existing office building and will match it in architectural style, materials and finishes, color, and floor-to-floor height.

1.	Title and Location of Project:	Combustion Research Facility, Phase II Sandia National Laboratories Livermore, California	2a. 2b.	Project No. 96-E-300 Construction Funded

8. Project Description, Justification and Scope (Continued)

Design of the existing mechanical building allowed space for the expansion of some services. Included in this project will be an additional chiller, pumps, and heat exchangers. Additional fan equipment providing recirculated conditioned air for the laboratory building and its addition will be in the loft space above the laboratory buildings. An additional electrical substation and process-cooling water system will also be provided.

Existing site utilities such as domestic and fire protection water, sanitary sewer, natural gas, site lighting, and electrical power and special systems will be modified and extended to service the additional facilities.

A key feature of the Combustion Research Facility is the availability of specially designed lasers for optical diagnostics. The Facility lasers developed in Phase I will continue to be used, and will be supplemented by two new Facility lasers: a high-power pulsed, high-repetition rate tunable ultraviolet laser (UV) and a subpicosecond laser. The laser beam directing system will be extended so that the existing and new laboratories have the capability of receiving the beam from any of the Facility lasers.

Other equipment includes a gas-chromatograph-mass spectrometer, infrared, visible, and ultraviolet spectrometers, elemental analyzers, optical signal processing equipment, and fast laser image processing devices.

Existing equipment from current facilities at SNL/L will be relocated to eleven of the new labs, although some of these experiments will be modified and some equipment will be upgraded. Two labs will be furnished with new equipment within the project TEC, and three labs will be furnished with new equipment by future users of the facilities.

This project will add vitally needed capacity and important new capabilities to the Combustion Research Facility at SNL, Livermore. The principal objective of this construction is to provide combustion research resources that can adequately deal with the critical needs of the 1990s and beyond. To accomplish this goal requires the addition of a new laboratory wing that emphasizes centralized next-generation laser diagnostic facilities and specially designed laboratories not available in CRF Phase I.

1.	Title and Location of Project:	Combustion Research Facility, Phase II Sandia National Laboratories Livermore, California	2a. 2b.	Project No. 96-E-300 Construction Funded

8. Project Description, Justification and Scope (Continued)

The overall scope of this project is the doubling of space available for experiments. Equipment funds are required for a new central laser system and special purpose laboratory equipment. A modest enlargement of the office building is included to house the rapidly increasing population of visiting scientists. These enhancements will consolidate the combustion-related resources at a single site readily accessible to visiting scientists.

There is a continuing need for the CRF to advance combustion-related science and technology to a higher level. The improvements included in the Phase II project will address this need. For example, special lasers and equipment will be developed to provide the ability to measure quantitatively entire two- and three-dimensional images of a system's physical and chemical properties with better resolution, and far greater speed than is now possible. It is this type of advance in the science of combustion that will allow the pursuit of the increasingly more difficult and complex problems that face our country.

CRF Phase II will enable attacking many complex problems directly associated with combustion. An important example is the need for improved combustion processes that incorporate high efficiency together with minimum production of pollutants such as NO_x and air toxics. Rapid progress on these problems both in engines and in furnaces requires Phase II's next-generation diagnostic capabilities. Completion of Phase II will also enable using the tools and expertise developed in Phase I to address broader challenges facing the country. CRF basic research in laser diagnostics, for example, will underpin remote sensing applications that contribute to global-change research and to nonproliferation of weapons. Basic research in chemically reacting flows will continue to support improved U.S. competitiveness in semiconductor processing and will support the development of new industrial materials. Basic research in chemistry will address new processes, such as supercritical water oxidation, for destroying hazardous wastes with minimal environmental impact.

The implementation of Phase II will develop and make available a new class of lasers. Phase II will include a specially designed high repetition rate laser system. This laser will be optimized for laser photochemistry combustion research and for high speed planar imaging of transient combustion phenomena. A second laser system will be designed to study combustion phenomena occurring on extremely short time scales (subpicosecond time scales). The new laser systems will enable significant extension of our knowledge in a broad range of topics in fundamental combustion science.

1.	Title and Location of Project:	Combustion Research Facility, Phase II Sandia National Laboratories Livermore, California	2a. 2b.	Project No. 96-E-300 Construction Funded

8. Project Description, Justification and Scope (Continued)

The normal increase in both the quantity and sophistication of combustion research by Sandia staff, together with the heightened requirements of visiting scientists, have completely saturated the facilities provided under CRF Phase I. During the past ten years the number of scientists who visit the CRF long enough to participate in research has almost tripled. In fiscal year 1993 forty professional staff hosted eighty nine such visits. Many important experiments cannot be carried out in the existing facilities because of a lack of space. Access to the unique capabilities of the CRF (such as the Facility lasers and computer resources) is essential for studying trade-offs between combustion efficiency and the pollution that results from existing and alternative fuels. However, much of the combustion research and diagnostics development work at Sandia is currently being done in facilities that are widely scattered throughout Sandia/CA where the researchers do not have access to these unique capabilities. Additional laboratories will permit the consolidation of these experiments at the CRF, thus providing the necessary access to the unique capabilities at the Facility. It will also provide adequate space and ready access to visiting scientists.

The number of offices required to support visiting researchers and staff must also be increased as each year of operation brings a large number of requests from qualified researchers to do work here who stay longer.

This addition is crucial to continuation of the lead role the CRF now plays in developing, improving, and applying advanced research methods for combustion science. As a result of successful technology transfer from the CRF to visiting scientists, there has been a significant advance in the research methods practiced by the combustion community. Given the increasingly difficult challenges faced in the use of fuel resources, the CRF mission must continue to emphasize advancing the frontiers of combustion science.

Without Phase II the technology at the CRF will stagnate, and opportunities for important new scientific research will be missed. The major advances in lasers and computers will not be brought to bear on pressing problems, nor made available to combustion researchers and designers in this country. CRF Phase II is also crucial to the success of programs in combustion research and diagnostics development. Currently, progress is hampered by the fractionation of the research effort. A significant amount of the experimental activities are housed in other buildings without direct access to the Facility lasers and other resources. Some of the activities are in security areas where it is difficult or impossible for uncleared visiting researchers to work. Moreover, the major portion of the diagnostics research is housed in a converted warehouse. It is essential that this activity be moved to an area that provides cleaner air, better temperature control, improved safety, access to the facility lasers, and unrestricted availability to users.

1.	Title and Location of Project:	Combustion Research Facility, Phase II Sandia National Laboratories Livermore, California	2a. 2b.	Project No. 96-E-300 Construction Funded

Finally, without the Phase II addition to the Facility, the size of the visiting scientist (user) program will have to be curtailed, due to the saturation of laboratory and office space. As a result, the ability for the combustion community to move on to more complex, yet realistically important research topics, will be constrained.

9. Details of Cost Estimate	Unit Cost	Item Cost	Total Cost
a. Engineering, design, and inspection (ED&I)			$4,200
1. Engineering, design, and inspection at approximately 22 percent of construction		3,000	
2. Construction management costs		900	
3. Project management		300	
b. Construction costs			13,800
1. Improvements to land		1,000	
Paving, walkways, landscaping, fencing, signage, road relocation parking lot rearrangement			
2. Buildings		12,000	
(a) Office Building (11,100 SF $193/SF)	2,100		
(b) Laboratory Building (21,200 SF $432/SF)	9,200		
(c) Mechanical Building (Existing)	700		
3. Utilities		800	
Water, sanitary sewer, natural gas, site lighting, electrical power, signal systems			
c. Standard equipment			6,800
Lasers, spectrometers, analyzers, processing equipment			
Subtotal			24,800
d. Contingency at approximately 8 percent of above costs			2,000
Total line item cost			$26,800

1.	Title and Location of Project:	Combustion Research Facility, Phase II Sandia National Laboratories Livermore, California	2a. 2b.	Project No. 96-E-300 Construction Funded

9. Details of Cost Estimate: (Continued)

ED&I costs for Title I and II reflect negotiated contract fees. ED&I for Title III is based on a negotiated fee plus an allowance for an extended period of construction, and for escalation. Construction costs and equipment costs have been escalated to mid points of construction and equipment procurement and installation. Escalation rates are in agreement with the DOE Price Change Index dated August 1993 for DOE construction projects, published by the DOE Independent Cost Estimating Staff.

Contingency is judged to be adequate for the remainder of the project. Construction of the laboratory shell was completed in FY 1990. Design was completed for the balance of the construction work in FY 1989. As a result of zero appropriations in FY 1989 through FY 1995 and the consequential schedule extension, some remaining ED&I and Project Management funds will be expended on obsolete Title II design elements prior to going to bid for remaining construction.

10. Method of Performance

Engineering, design, and inspection will be performed under negotiated architect and engineer contracts. Construction, procurement of equipment, and occupancy will be accomplished by fixed price contracts awarded on the basis of competitive bidding.

1. Title and Location of Project:	Combustion Research Facility, Phase II Sandia National Laboratories Livermore, California	2a. Project No. 96-E-300 2b. Construction Funded

11. Schedule of Project Funding and Other Related Funding Requirements

	Prior Years	FY 1995	FY 1996	FY 1997	FY 1998	FY 1999	Total
a. Total project funding							
1. Total facility costs							
(a) Line item	$4,205	$ 4	$ 685	$ 6,740	$ 8,476	$6,690	$26,800
Total direct cost	4,205	4	685	6,740	8,476	6,690	26,800
2. Other project costs							
(a) Other project costs	220	0	0	500	750	750	2,220
(b) Capital equipment	0	0	0	500	250	250	1,000
Total other project costs	220	0	0	1,000	1,000	1,000	3,220
Total project cost (TPC)	$4,425	$ 4	$ 685	$7,740	$ 9,476	$7,690	$30,020

b. Related annual costs a/ (estimated life of building: 50 years)

1. Facility operating costs	$ 300
2. Programmatic operating expenses directly related the facility	2,400
3. Capital equipment not related to construction but related to the programmatic effort in the facility	400
4. GPP or other construction related to programmatic effort in the facility	200
5. Other costs	0
Total related annual costs	$ 3,300[a/]

a/ Estimated costs in thousands escalated to 1999-year dollars. The related annual funding displayed is related to CRF, Phase II project only. These amounts are in addition to annual funding for the existing CRF operations ($4,739,000 in the FY 1997 OMB Budget Request).

1. Title and Location of Project:	Combustion Research Facility, Phase II Sandia National Laboratories Livermore, California	2a. Project No. 96-E-300 2b. Construction Funded

12. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project costs:
   1. Total facility costs
      (a) Construction Line Item as described in previous items.
   2. Other project costs
      (a) Other project costs
      $220,000 of operating funds have been paid to architect engineering firms for preparation of conceptual designs/conceptual design reports and supplemental information for this project. $500,000 in FY 1997, $750,000 in FY 1998, and $750,000 in FY 1999, are operating costs associated with the new facility.
      (b) $500,000 in FY 1997, $250,000 in FY 1998, and $250,000 in FY 1999 is for capital equipment associated with the new facility.

b. Related annual costs:
   1. Facility operating costs
      This cost represents the annual operating expenses for utilities, maintenance, and janitorial service incurred due to the increase of 32,300 gross square feet in laboratory and office space.
   2. Programmatic operating expenses
      Staff increase resulting from this project is estimated to be six people. Costs also include acquisition of computer resources that will serve both resident staff and visiting scientists.
   3. Capital equipment not related to construction
      The increase in annual capital equipment is estimated at $400,000. This is in addition to capital equipment funds currently allocated to the CRF.
   4. Maintenance, repair, GPP or other construction related to programmatic effort
      The annual GPP needs for Phase II are expected to be approximately $200,000. This is in addition to GPP funds presently allocated to the CRF.
   5. Other costs - No other costs are anticipated.

COMPUTATIONAL AND TECHNOLOGY RESEARCH

PROGRAM MISSION

The mission of the Computational and Technology Research (CTR) program is to perform long-term computational, technology, and advanced energy projects research in support of the goals of the Office of Energy Research strategic plan, and the mission of the Department of Energy (DOE).

The GOAL of the CTR program is:

To address complex problems important to the mission of the Department of Energy and to the nation, through an integrated program in applied mathematical sciences, high performance computing and communications, information infrastructure, advanced energy projects research, and technology research. Research at the forefront of scientific research is becoming more multidisciplinary and fast-paced, calling for new approaches. The CTR program emphasizes multidisciplinary research, often with federal and private sector partners. The program exploits the capabilities and research skills at universities, national laboratories, and industrial research laboratories. The CTR program funds research that extends from fundamental investigations to technology development. This includes activities such as High Performance Computing and Communications, the National Information Infrastructure, inter-agency development of the Next Generation Internet, and the joint Energy Research-Defense Programs DOE 2000 initiative. The program also explores advanced energy concepts to establish their scientific feasibility. Technology research activities include multi-year collaborations, technical assistance to small business and the Environmental Technology Partnerships. The program works closely with other Energy Research, Departmental, and other agency programs.

PROGRAM MISSION - COMPUTATIONAL AND TECHNOLOGY RESEARCH (Cont'd)

The OBJECTIVES related to these goals are:

1. To CONTRIBUTE TO SUSTAINABLE ENERGY PRODUCTION AND USE - Conduct research that creates scientific and engineering knowledge in support of Department of Energy mission thrusts to accelerate the utilization and development of energy technologies in a safe and environmentally compatible manner.

2. To PROVIDE WORLD CLASS COMPUTING FACILITIES - Provide and operate major user supercomputer facilities needed for DOE research and foster research partnerships with industry and the entire scientific community. These facilities include the National Energy Research Scientific Computing (NERSC) Center at Lawrence Berkeley National Laboratory, the Energy Sciences Network (ESnet), and specialized high-end computing research facilities at Los Alamos National Laboratory, Oak Ridge National Laboratory, Lawrence Berkeley National Laboratory, and Argonne National Laboratory. Thousands of scientists and engineers use these facilities to advance knowledge and develop new products, materials, and manufacturing processes.

3. To ENSURE THAT RESEARCH RESULTS ARE WIDELY KNOWN, VALUED AND USED - Promote open communications and the transfer of information and technology among universities, government, and the private sector. Activities include peer-review of research activities, presentation of results at meetings and in peer-reviewed scientific journals, strong coordination and planning with the energy technology offices of the Department, co-location of researchers with partner programs, input from stakeholders, and in-depth workshops and conferences among scientists and engineers with management sponsorship and participation. The national laboratories and universities are unique resources to bring about many of these important interactions.

MAJOR ACTIVITIES:

1. Mathematical, Information, and Computational Sciences:
   Supports forefront, diverse applied mathematical sciences, high performance computing, communications and information infrastructure research that spans the spectrum of activities from strategic fundamental research to technology development and demonstration.

2. Laboratory Technology Research:
   Supports high risk, long-term technology research that advances basic research results to a stage where industry and DOE technology programs can exploit the technologies for improved energy utilization and efficiency.

PROGRAM MISSION - COMPUTATIONAL AND TECHNOLOGY RESEARCH (Cont'd)

3. Advanced Energy Projects:
   Supports research to establish the feasibility of novel, high risk/high payoff energy-related concepts that span the Department's energy mission and goals.

SCIENTIFIC FACILITIES UTILIZATION:

The Computational and Technology Research program request includes $26,500,000 in FY 1998 to support the NERSC. This investment will provide research time for about 5,000 scientists in universities, Federal agencies, and U.S. companies. It will also leverage both Federally and privately sponsored research, consistent with the Administration's strategy for enhancing the U.S. National science investment. The proposed funding supports the number of users served in FY 1996, which was an increase over FY 1995 levels, and will maintain the quality of service and availability of facility resources to users, including university and government scientists, as well as private companies who rely on unique DOE facilities for their basic research needs. The proposed funding level will also provide for efficient utilization of high technology facilities, which are generally oversubscribed by factors of two to three. Research communities that will benefit from this initiative include structural biology, superconductor technology, medical research and technology development, materials, chemical and plasma sciences, high energy and nuclear physics, and environmental and atmospheric research.

PERFORMANCE MEASURES:

The Computational and Technology Research program performs three different types of activities: operate facilities that provide service for ER and DOE; conduct basic research in areas such as computational science, mathematics, and advanced energy principles; and perform technology research to bridge the gap between basic research and industrial needs.

Facilities Operations: Facilities and infrastructure including NERSC and ESnet are operated to meet user and overall ER program requirements, as indicated by achieving performance specifications while protecting the safety of the workers and the environment; operating facilities reliably and according to planned schedules; and maintaining and improving facilities at reasonable costs. Facility performance measures include achievement of performance specifications, operating time, throughput, user satisfaction and effective utilization of resources as determined by external reviews, user steering committees, and internal ER program manager committees.

PROGRAM MISSION - COMPUTATIONAL AND TECHNOLOGY RESEARCH (Cont'd)

Basic Research: The scientific and technical merit, appropriateness, and quality of the Computational and Technology Research programs are judged by rigorous peer reviews conducted by internationally recognized scientific experts. Highest quality research is maintained by taking appropriate management actions based on the results of the peer reviews. Other measures of the quality of the research are sustained achievements in advancing knowledge, as indicated by publication of research results in refereed scientific journals and by invited participation at national and international conferences and workshops; and by awards received by CTR supported researchers.

Bridging Technology Gap: The purpose of the Laboratory Technology Research (LTR) subprogram is to bridge from basic research to the point where industry and DOE's technology programs can exploit the innovations for energy applications. Accordingly, performance is judged by the number of technology projects and ideas that are subsequently supported or implemented by either industry or DOE's technology programs, and the economic and commercial impact of products and processes resulting from the projects, as indicated, for example by R&D 100 awards.

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- The NERSC was recompeted to optimize program effectiveness and was moved from Lawrence Livermore National Laboratory to Lawrence Berkeley National Laboratory in FY 1996. NERSC operating costs were reduced by $8,149,000 from FY 1996 to FY 1997 reflecting efficiencies committed to by the CTR program.

- The first phase of DOE's computational Grand Challenge program, begun in FY 1992, was completed in early FY 1997. The program had two beneficial results: (1) significant improvement in the ability to use high-end computers in scientific research, including software advances and improved high-end computers, (2) scientific advances, based on high performance computing, in materials science, environmental chemistry, climate and ocean modeling, plasma physics, elementary particle physics, and oil reservoir modeling. The second phase of the Grand Challenge program was competed and initiated in FY 1997 in partnership with all other ER program offices and other DOE program offices.

- The LTR subprogram won an impressively large share of the 1996 R&D 100 Awards received by DOE programs (8 out of 32), as well as two Popular Science "What's New" awards. An external peer review of all current LTR projects also showed that this program has high scientific quality.

COMPUTATIONAL AND TECHNOLOGY RESEARCH
PROGRAM FUNDING PROFILE
(dollars in thousands)

Subprogram	FY 1996 Enacted Appropriation		FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Mathematical, Information, and Computational Sciences.	$ 0	a/	$ 117,490	$ 0	$ 117,490	$ 152,490
Laboratory Technology Research	0	b/	24,310	0	24,310	15,829
Advanced Energy Projects	0	a/	11,700	0	11,700	7,588
Subtotal, Computational and Technology Research	$ 0		$ 153,500	$ 0	$ 153,500	$ 175,907
Adjustment	0		-2,522	c/ 0	-2,522	c/ 0
TOTAL, CTR	$ 0		$ 150,978	$ 0	$ 150,978	$ 175,907

a/ Previously budgeted in the Basic Energy Sciences program.
b/ Previously budgeted in the ER Laboratory Technology Transfer program.
c/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction was applied at the appropriation level.

Public Law Authorization:
Pub. Law: 95-91, DOE Organization Act

COMPUTATIONAL AND TECHNOLOGY RESEARCH
(Dollars in thousands)

PROGRAM FUNDING BY SITE

Field Offices/Sites	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Albuquerque Operations Office					
Los Alamos National Laboratory	$0	$14,858	$0	$14,858	$12,648
National Renewable Energy Laboratory	0	150	0	150	147
Sandia National Laboratories	0	4,428	0	4,428	3,569
Chicago Operations Office					
Ames Laboratory	0	2,034	0	2,034	1,942
Argonne National Laboratory	0	13,272	0	13,272	14,243
Fermi National Accelerator Laboratory	0	0	0	0	0
Brookhaven National Laboratory	0	2,863	0	2,863	3,359
Princeton Plasma Physics Laboratory	0	0	0	0	0
Idaho Operations Office					
Idaho National Engineering Laboratory	0	0	0	0	0
Oakland Operations Office					
Lawrence Berkeley National Laboratory	0	42,932	0	42,932	49,520
Lawrence Livermore National Laboratory	0	665	0	665	660
Stanford Linear Accelerator Center	0	0	0	0	0
Oak Ridge Operations Office					
Oak Ridge National Laboratory	0	11,540	0	11,540	9,069
Thomas Jefferson National Accelerator Facility	0	180	0	180	180
Richland Operations Office					
Pacific Northwest National Laboratory	0	2,275	0	2,275	2,960
All Other Sites a/	0	58,303	0	58,303	77,610
Subtotal	0	153,500	0	153,500	175,907
Adjustment	0	-2,522 b/	0	-2,522 b/	0
TOTAL	$0	$150,978	$0	$150,978	$175,907

a/ Funding provided to universities, industry, other Federal agencies and other miscellaneous contractors.

b/ Share of Energy Supply Research and Development general reduction for use of prior year balances assigned to this program on a comparable basis. The total general reduction was applied at the appropriation level.

COMPUTATIONAL AND TECHNOLOGY RESEARCH

MATHEMATICAL, INFORMATION, AND COMPUTATIONAL SCIENCES

I. **Mission Supporting Goals and Objectives**: The Mathematical, Information, and Computational Sciences (MICS) subprogram is a forefront, diverse program in applied mathematical sciences, high performance computing, communications and information infrastructure that spans the spectrum of activities from strategic fundamental research to technology development and demonstration. The diverse activities supported by this program are integrated to support two major strategic thrusts: (1) the National Collaboratories (NC) thrust that develops tools and capabilities to permit scientists and engineers working at different DOE and other facilities to collaborate on research as easily as if they were in the same building; (2) the Advanced Computational Testing and Simulation (ACTS) thrust that develops an integrated set of algorithms, software tools and infrastructure to enable computer simulation to better complement experiment and theory or to be used in place of experiments when real experiments are too dangerous, expensive, or inaccessible. These two strategic thrusts support the mathematics, computational science, and information technology needs of all DOE technical mission areas (e.g., Fundamental Research, Defense, Energy Efficiency, Fossil Energy, and Environmental programs). The efforts in these areas are closely coordinated with related activities supported by Defense Programs.

The FY 1998 request includes funding for the DOE 2000 initiative, a joint Energy Research - Defense Programs effort to develop and test a common technology base that will permit scientists and engineers at various remote sites to simultaneously participate in research at large science facilities. It will also foster advanced computational testing and simulation tools to attack complex technical problems and accelerate applications critical to DOE missions. The DOE 2000 initiative is coordinated with parallel research in other agencies through the Committee on Computing, Information, and Communication (CCIC) of the National Science and Technology Council; it extends throughout DOE through partnerships with other DOE programs.

The FY 1998 request also includes funding for the Department's participation in the President's Next Generation Internet Initiative. This initiative, which involves a number of Federal agencies, has three goals: (1) connect universities and national laboratories with high speed networks that are 100-1000 times faster than today's Internet; (2) promote experimentation with the next generation of networking technologies; and (3) demonstrate new applications that meet important national goals and missions. This initiative will leverage previous MICS investments in ESnet and other advanced networking technologies. In addition, a number of the DOE 2000 National Collaboratory applications are important for the third goal.

The MICS subprogram also supports and responds to the Energy Policy Act (EPACT) and to the High Performance Computing Act of 1991 and provides supercomputer access and advanced communication capabilities, through the National Energy Research Scientific Computing (NERSC) Center and the Energy Sciences Network (ESnet), to scientific researchers.

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Mathematical, Computational, and Computer Sciences Research...	$ 0	$ 48,997	$ 47,026	$- 1,971	- 4.0%
Advanced Computation, Communications, and Associated Activities.	0	65,534	101,784	+36,250	+55.3%
SBIR/STTR	0	2,959	3,680	+ 721	+24.4%
Total	$ 0	$117,490	$ 152,490	$+35,000	+29.8%

III. Performance Summary - Accomplishments:

	FY 1996	FY 1997	FY 1998
Mathematical, Computational, and Computer Sciences Research			
- Research supporting advanced computational testing and simulation including applied mathematics research, computer science and software tools research, grand challenge applications, and computational science education programs. Capital equipment supporting research in advanced computational testing and simulation including computers, storage devices and other peripheral equipment.	$0	$46,497	$42,026
- Support of the joint Energy Research/Defense Programs Research program started in FY 1997 under the DOE 2000 initiative to develop and begin deployment of integrated sets of advanced computational tools including software frameworks, tools for complex geometries and advanced parallel software to accelerate the accomplishment of DOE missions.	0	2,500	5,000
SUBTOTAL Mathematical, Computational, and Computer Sciences Research	$0	$48,997	$47,026

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
Advanced Computation, Communications, and Associated Activities			
- Research in support of National Collaboratories: high capability networks, information surety, underlying technologies to support national collaboratories, and underlying technologies to support electricity supply and demand management.	$ 0	$ 9,012	$ 3,936
- Research under the DOE 2000 initiative to develop and begin deployment of integrated sets of advanced electronic collaboration tools to accelerate the accomplishment of DOE missions by making it as easy for scientists and engineers to work together across the country as if they were in the same building. This will include remote operation of experiments at national user facilities.	0	6,000	6,000
- Research in support of the President's Next Generation Internet Initiative to: (1) connect universities and national laboratories with high speed networks that are 100-1000 times faster than today's Internet; (2) promote experimentation with the next generation of networking technologies; and (3) demonstrate new applications that meet important national goals and missions. The funding is part of a coordinated multi-agency program.	0	0	35,000

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
- Support for the NERSC Center, which provides high performance computing for investigators supported by the Office of Energy Research. The Center serves more than 5,000 users working on about 700 projects, of which about 35% are university based, 60% are in National Laboratories, and 5% are in industry. NERSC provides a spectrum of supercomputers that offers a range of high performance computing resources and associated software support that is a critical element in the success of many ER research programs. These computational resources are integrated together by a common high performance file storage system which facilitates interdisciplinary collaborations. Related capital equipment needs are also supported.	0[a/]	19,130[b/]	26,500
-Support for ESnet operations which provide worldwide access to Energy Research facilities, including: advanced light sources; neutron sources; particle accelerators; fusion reactors; spectrometers; High Performance Computing Resource Providers (HPCRPs); and other leading-edge science instruments and facilities. Future upgrades will allow for remote experimentation and remote access to these facilities, as National Collaboratory technologies are developed and deployed. Related capital equipment needs are also supported.	0	14,787	13,787

a/ In FY 1996, funding for NERSC was provided in the Basic Energy Sciences and Fusion Energy Sciences programs at $34,649,000.

b/ In FY 1997, an additional $7,370,000 of Fusion Energy Sciences funds were provided for total NERSC funding of $26,500,000.

III. Performance Summary- Accomplishments:	FY 1996	FY 1997	FY 1998
-HPCRPs at Oak Ridge National Laboratory, Los Alamos National Laboratory, and Argonne National Laboratory which provide the needed leading edge computational hardware testbeds to support grand challenge and advanced computational testing and simulation research. Related capital equipment needs are also supported.	0	16,605	16,561
SUBTOTAL Advanced Computation, Communications, & Associated Activities	0	65,534	101,784
SBIR/STTR Funding The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only since Part D, Section 110 of P.L. 104-208, making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.	0	2,959	3,680
TOTAL Mathematical, Information, and Computation Sciences	$ 0	$117,490	$152,490

COMPUTATIONAL AND TECHNOLOGY RESEARCH
MATHEMATICAL, INFORMATION, AND COMPUTATIONAL SCIENCES

EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:

Reduce funding for: Adventures in Supercomputing Program with transfer of responsibilities to the States in which it is operated, grand challenges by conducting early progress review and termination of efforts which are less productive, and Advanced Computational Testing and Simulation (ACTS) and capital equipment related to ACTS research.	$-4,471,000
Provide full funding for operations of NERSC.	+7,370,000
Reduce funding for National Collaboratory Research based on review of projects and alignment of funding with MICS missions.	-5,076,000
Reduce ESnet operations to respond to changes in priorities for network services.	-1,000,000
Increase funding to initiate the Next Generation Internet Initiative.	+35,000,000
Increase funding for DOE 2000 ACTS Toolkit efforts to provide expanded sets of tools and capabilities.	+2,500,000
Reduce support for HPCRPs.	-44,000
Increase SBIR funding due to increase in operating expenses. No STTR funding requested in FY 1998.	+721,000
Total Funding Change, Mathematical, Information, and Computational Sciences	$+35,000,000

COMPUTATIONAL AND TECHNOLOGY RESEARCH

LABORATORY TECHNOLOGY RESEARCH

I. **Mission Supporting Goals and Objectives:** The Laboratory Technology Research (LTR) subprogram conducts technology research projects in support of Office of Energy Research (ER) goals, as defined by the strategic plan, to reduce technical risk associated with technology or process development. The program links the basic research advances at ER national laboratories to applied energy technologies through leveraged collaborations with industry. The program contributes to technological innovations in three critical technology research areas: tailored materials, intelligent manufacturing, and sustainable environments. This research will contribute to national economic growth and increase the return on the government investment in basic research. For example, research on intelligent manufacturing, such as sensor-computer-machine control systems, will focus on high risk technological problems for ultimate commercial applications with high payoff. The potential for large payoff is based on the explosive growth in inexpensive computer technologies and the ability to incorporate them into control systems.

Research is conducted through collaborations with industrial partners, including multi-year projects, personnel exchanges, and technology research and maturation projects. Peer review is used to evaluate proposed collaborations on the basis of scientific merit, program relevance, and commercial potential. The subprogram allows small business quick and easy access to research and development at the energy laboratories, such as through personnel exchanges between the laboratories and industry.

The LTR subprogram supports and responds to the National Competitiveness Technology Transfer Act (NCTTA) of 1989 and provides a mechanism for Federal investment in public-private R&D partnerships necessary to keep America competitive. LTR does not provide Federal funds directly to the private sector. Private sector research partners bear all of their own expenses. Rather, Federal investments at the National Laboratories support laboratory researchers engaged in research partnerships that benefit all major stakeholders - the DOE, the industrial partners, and the general public. The investments capitalize on two great strengths of this country: 1) the world class basic research of the National Laboratories, and 2) the unparalleled entrepreneurial spirit of American industry.

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Laboratory Technology Research	$ 0	$ 13,931	$ 15,433	$+ 1,502	+ 10.8%
SBIR/STTR	0	644	396	- 248	- 38.5%
Congressional Direction	0	9,735	0	- 9,735	-100.0%
Total	$ 0	$ 24,310	$ 15,829	$- 8,481	- 34.9%

III. Performance Summary - Accomplishments:

	FY 1996	FY 1997	FY 1998
-About 10 technology research projects will be initiated in FY 1998 that link the basic research advances of Office of Energy Research national laboratories to applied technologies through leveraged collaborations with industry. The program focuses on key administration initiatives, including tailored materials, intelligent manufacturing, and sustainable environments. For example, research on intelligent manufacturing, such as sensor-computer-machine control systems, will focus on high risk technological problems for ultimate commercial applications with high payoff. Approximately 65 current technology research projects will be continued. A minimal level of quick and easy access by small business to the research and development at the national laboratories will be provided through, for example, personnel exchanges.	$ 0	$ 13,931	$ 15,433
SBIR/STTR Funding	0	644	396

The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only since Part D, Section 110 of P.L. 104-208, making Omnibus Consolidated Appropriations for FY 1997, reauthorized STTR for FY 1997 only.

III. Performance Summary - Accomplishments:	FY 1996	FY 1997	FY 1998
Congressional Direction	0	9,735	0
-Funds the University of Southwestern Louisiana (per Congressional direction). No additional funds were provided for this project by the Congress in FY 1997.			
TOTAL Laboratory Technology Research	$ 0	$ 24,310	$ 15,829

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

Initiate about 10 technology research projects while continuing about 10 projects begun in FY 1997. These projects are multi-year collaborations between ER national laboratories and industry on key administration initiatives.	$ +1,502,000
Funding not needed in FY 1998 for FY 1997 projects included by Congress without funds.	-9,735,000
Reduce SBIR funding due to decrease in operating expenses. No STTR funding requested in FY 1998.	-248,000
Total Funding Change, Laboratory Technology Research	$ -8,481,000

COMPUTATIONAL AND TECHNOLOGY RESEARCH

ADVANCED ENERGY PROJECTS

I. **Mission Supporting Goals and Objectives:** This activity funds research to establish the feasibility of novel, energy-related concepts that span the Department's energy mission and goals. These concepts are usually derived from recent advances in basic research, but require additional research to establish their feasibility. A common theme for each concept is the initial linkage of new, or previously neglected, research results to a practical energy payoff for the Nation. Efforts are typically supported up to a level of about $300,000 per year for a period of 3 years. Projects are selected from proposals submitted by universities, industrial organizations, non-profit research institutions, and national laboratories. Equal consideration is given to each submission. Funding criteria emphasize scientific merit as judged by peer review.

II. **Funding Schedule:**

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Advanced Energy Projects	$ 0	$ 11,398	$ 7,406	$- 3,992	-35.0%
SBIR/STTR	0	302	182	- 120	- 39.7%
Total	$ 0	$ 11,700	$ 7,588	$- 4,112	-35.1%

III. **Performance Summary - Accomplishments:**

	FY 1996	FY1997	FY 1998
Support of AEP projects will be reduced. All of the 30 on-going projects will be closely examined. About five of these projects will be terminated before completion. No new projects will be initiated. Capital equipment related to the remaining AEP projects will be supported.	$0	$11,389	$7,406
SBIR/STTR Funding	0	311	182
The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only since Part D, Section 110 of P.L. 104-208, making Omnibus Consolidated Appropriations for FY 1997, reauthorized STTR for FY 1997 only.			
TOTAL Advanced Energy Projects	$ 0	$ 11,700	$ 7,588

COMPUTATIONAL AND TECHNOLOGY RESEARCH
ADVANCED ENERGY PROJECTS

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

Reduce the number of projects in emerging scientific and technical areas consistent with the highest priorities of the Office of Energy Research and the Department of Energy mission.	$ -3,992,000
Reduce SBIR funding due to decrease in operating expenses. No STTR funds requested in FY 1998.	- 120,000
Total Funding Change, Advanced Energy Projects	$-4,112,000

COMPUTATIONAL AND TECHNOLOGY RESEARCH
CAPITAL OPERATING EXPENSES AND CONSTRUCTION SUMMARY
(Dollars in thousands)

	FY 1996	FY 1997	FY 1998	$ Change	% Change
Capital Operating Expenses					
Capital Equipment (total).....	$0	$6,115	$5,575	-$540	-8.8%

Major Items of Equipment (CE $2 million and Above)	TEC	Previous Appropriated	FY 1996 Appropriated	FY 1997 Appropriated	FY 1998 Request	Acceptance Date
1. Archival Systems Upgrade - LBNL	$2,000	0	0	$2,000	0	4/97

ENERGY RESEARCH ANALYSES

PROGRAM MISSION

The mission of the Energy Research Analyses (ERA) program is to evaluate the quality and impact of Department of Energy research programs and projects.

The GOAL of the ERA program is to:

Provide Department of Energy program managers and senior managers with objective assessments of research projects and programs in order to evaluate the quality and impact of these efforts, to identify undesirable duplications and gaps, and to provide analysis of key technical issues in support of long range energy research planning, science and technology planning, and technical and performance evaluation of departmental programs and objectives.

The OBJECTIVES related to these goals are:

1. To PROVIDE THE BASIS FOR JUDGMENTS ON THE QUALITY OF RESEARCH AND ITS IMPACT. Using merit review with peer evaluation, provide departmental program managers and their superiors with detailed information about the technical strengths and weaknesses of projects that comprise the R&D program as a basis for judgment of the quality of the research and its impact.

2. To PROVIDE INDEPENDENT VIEWS OF FUTURE R&D NEEDS IN AREAS OF INTEREST TO THE DEPARTMENT. Evaluate the status of science and technology areas of potential importance to the Department's mission, and to lay out appropriate fundamental and applied research and development to hasten the advance towards potential energy applications.

3. To DEVELOP STRATEGIC AND PERFORMANCE PLANS. Use advice from outside experts, advisory committees, departmental managers, national laboratory managers, industrial scientists and managers, and officials of other government agencies to formulate strategic and performance plans for the Office of Energy Research and for the Science and Technology business line of the Department.

PROGRAM MISSION - ENERGY RESEARCH ANALYSES (Cont'd)

4. To CONTRIBUTE TO DOE AND INTERAGENCY PROGRAM ANALYSIS AND PLANNING FOR GOVERNMENT SCIENCE AND TECHNOLOGY. Participate in committees, task forces, working groups, and workshops of the Department of Energy and organizations such as the National Science and Technology Council, the National Science Foundation, the National Academy of Sciences, and private sector organizations such as the Industrial Research Institute, and the Electric Power Research Institute.

PERFORMANCE MEASURES:

1. Quality and value of peer review evaluations, as indicated by satisfaction of investigators and program managers and actions taken to improve or replace projects that have significant shortcomings, and to capitalize on the strengths of stronger projects.

2. Satisfaction by customer program managers with assessments of science and technology needs, as indicated by changes or additions to make DOE programs and projects more productive and relevant to DOE missions.

3. Quality and acceptance of strategic and performance plans, as indicated by their use by the Director of the Office of Energy Research and by program offices in multi-year program planning, program management, and in effectively justifying programs.

4. Influence on government science and technology planning and analysis, as indicated by contributions to DOE, interagency, and outside recommendations on science policies and plans.

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

1. Independent peer reviews verified the quality and relevance of over 100 DOE projects and tasks in FY 1997. These levels of effort will be scaled down slightly in FY 1998 to accommodate the reduced funding.

2. An improved and systematic process for appraisal of Energy Research Laboratories was developed in FY 1996. Implementation of this program for the Office of Energy Research will continue in FY 1997 and FY 1998.

3. A new DOE-wide system for simplified technical reviews of National Laboratories has been developed with the participation of all affected parties, including the National Laboratories and DOE Operations Offices. The pilot process for the new system will be completed in the second quarter of FY 1997 at three National Laboratories, and implemented across the Department in FY 1998.

ENERGY RESEARCH ANALYSES

PROGRAM FUNDING PROFILE
(Dollars in thousands)

	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Research	$3,337	$2,000	$0	$2,000	$1,500
Subtotal Energy Research Analyses	3,337	2,000	0	2,000	1,500
Adjustment	-337 a/	-249 a/	0	-249 a	----
TOTAL	$3,000 b/	$1,751	$0	$1,751	$1,500

a/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

b/ Excludes $66,000 which was transferred to the SBIR program and $5,000 which was transferred to the STTR program.

Public Law Authorizations:

Section 209, Public Law 95-91, DOE Organization Act

ENERGY RESEARCH ANALYSES

PROGRAM FUNDING BY SITE
(Dollars in thousands)

Field Offices/Sites	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Albuquerque Operations Office					
Los Alamos National Laboratory.....	$50	$0	$0	$0	$0
Chicago Operations Office.					
Argonne National Laboratory.....	250	0	0	0	0
Brookhaven National Laboratory.....	0	0	0	0	0
Oak Ridge Operations Office					
Oak Ridge National Laboratory.....	525	0	0	0	0
Oakland Operations Office					
Lawrence Berkeley National Laborator	45	0	0	0	0
Richland Operations Office					
Pacific Northwest National Laboratory..	575	0	0	0	0
All Other Sites a/.....	1,892	2,000	0	2,000	1,500
Subtotal.....	3,337	2,000	0	2,000	1,500
Adjustment	-337 b/	-249 b/	0	-249 b/	----
TOTAL	$3,000 c/	$1,751	$0	$1,751	$1,500

a/ Funding provided to laboratories, universities, industry, other Federal agencies and other miscellaneous contractors.

b/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

c/ Excludes $66,000 which was transferred to the SBIR program and $5,000 which was transferred to the STTR program.

ENERGY RESEARCH ANALYSES

I. **Mission Supporting Goals and Objectives:** The Energy Research Analyses (ERA) program assesses research projects and programs in order to judge the significance of these efforts and to identify undesirable duplications and gaps. Peer reviews of individual research projects using outside experts are performed. Technical assessments to determine the direction of future research and state-of-the-science reviews are also performed. The program also provides analysis in support of long range energy research planning, science and technology planning, and technical evaluation of DOE programs and objectives.

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Energy Research Analyses	$ 3,337	$ 1,947	$ 1,462	$ -485	- 24.9%
SBIR	0	53	38	-15	- 28.3%
Total	$ 3,337	$ 2,000	$ 1,500	$ -500	- 25.0%

III. Performance Summary- Accomplishments

	FY 1996	FY 1997	FY 1998
-Evaluate the quality and relevance of research projects in Energy Research, Fossil Energy, and Energy Efficiency by independent peer reviews and assess additional technical needs in Energy Research, Fossil Energy, and Energy Efficiency (e.g., advanced composite materials). Evaluate critical planning and policy issues of DOE science and technology through reviews by expert groups outside the Department such as the National Academy of Sciences and the JASON group.	$3,337	$1,947	$1,462
-SBIR/STTR Funding (NOTE: In FY 1996, $66,000 and $5,000 were transferred to the SBIR and STTR programs, respectively. The FY 1997 estimate is for both SBIR and STTR. The FY 1998 estimate is for SBIR only since Part D, Section 110 of P.L. 104-208, Making Omnibus Consolidated Appropriations for FY 1997 reauthorized STTR for FY 1997 only.	0	53	38

ENERGY RESEARCH ANALYSES

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

Significant decrease in the number of peer reviews conducted.	$-485,000
SBIR funding is decreased due to a decrease in operating expenses. STTR funding is not budgeted in FY 1998.	$ -15,000
Total Funding Change, Energy Research Analyses	$-500,000

ER LABORATORY TECHNOLOGY TRANSFER

PROGRAM MISSION

This program is transferred to the Computational and Technology Research program beginning in FY 1997. The mission of the Energy Research Laboratory Technology Transfer (TT) program is to conduct industry-driven technology research collaborations at ER laboratories to leverage expertise with industrial resources for mutual benefit. The program responds to Executive Order 12591 "Facilitating Access to Science and Technology," and a series of legislation, e.g., the National Competitiveness Technology Transfer Act of 1989, which requires Federal laboratories to collaborate with the private sector in broadening the Nation's technology base. The program allows ER laboratories, which are a significant part of the national research network, to contribute technological innovations to stimulate national economic growth, and to permit the government and the taxpayers to receive a return on the government investment in basic science by supporting jointly funded, pre-competitive technology research projects in promising critical technology areas. The projects provide leveraged benefit back to the laboratories' core competencies and the Department's public mission of energy, research, and the environment.

The GOAL of the TT program is:

To provide cost-effective and responsive access to ER laboratory expertise by private sector partners, particularly small business; increase the knowledge-based skills of the national laboratories and leverage their resources; and reduce technical risk to a point where industry will pursue the product or process development on its own.

The OBJECTIVES related to these goals are:

1. To STRENGTHEN DOE CORE COMPETENCIES by focusing collaborations with industry specifically in the areas of manufacturing, materials, energy and environment to advance laboratory capabilities.

PROGRAM MISSION - ER LABORATORY TECHNOLOGY TRANSFER - (Cont'd)

2. To CONTRIBUTE TO NATIONAL ECONOMIC COMPETITIVENESS by supporting peer reviewed, competitively selected collaborations which advance technologies emerging from basic science.

3. To CONTRIBUTE TO SMALL BUSINESS by supporting efficient deployment mechanisms to allow small businesses access to the technology base and resources of the national laboratories.

4. To REDUCE RISK OF TECHNOLOGY RESEARCH by supporting innovative, cost-effective approaches to technological challenges.

5. To BRIDGE BETWEEN BASIC AND APPLIED SCIENCE by supporting technology research projects which foster utilization of Energy Research's science base by other private and public research activities.

PERFORMANCE MEASURES:

Performance measures related to technology transfer activities include qualitative incremental reductions in technical risks as well as quantitative measures. The quality of the projects is evaluated through peer review, site visits, and workshops by the program staff. Quantitative performance measures include the total number of projects supported, the level of small business involvement, and level of industry cost share.

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- This program was transferred to the Computational and Technology Research program in FY 1997.
- The concentration of partnerships in laboratory core competencies has increased the benefit back to the Department's public missions.
- The streamlining of the program and increasing delegation to the laboratories with resultant reduction in CRADA processing time by 50%.
- The rapid growth in technical assistance provided to small business.

ER LABORATORY TECHNOLOGY TRANSFER

PROGRAM FUNDING PROFILE
(dollars in thousands)

Subprogram	FY 1996 Enacted Appropriation		FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
ER Laboratory Technology Transfer.....	$ 16,672		$0	$0	$0	$0
Subtotal, ER Laboratory Technology Transfer....	16,672		0	0	0	0
Adjustment.....	-2,358	a/	0	0	0	0
TOTAL, ER Laboratory Technology Transfer....	$ 14,314	b/	$0 c/	$0 c/	$0 c/	$0 c/

a/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction was applied at the appropriation level.

b/ Excludes $109,000 which was transferred to the SBIR program and $12,000 which was transferred to the STTR program.

c/ This program was transferred to the Computational and Technology Research program in FY 1997.

Public Law Authorization:

Pub. Law: 95-91, DOE Organization Act

ER LABORATORY TECHNOLOGY TRANSFER

PROGRAM FUNDING BY SITE
(Dollars in thousands)

Field Offices/Sites	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Chicago Operations Office					
Ames Laboratory	$20	$0	$0	$0	$0
Argonne National Laboratory	3,016	0	0	0	0
Brookhaven National Laboratory	2,168	0	0	0	0
Princeton Plasma Physics Laboratory	82	0	0	0	0
Oak Ridge Operations Office					
Oak Ridge Institute for Science and Education	33	0	0	0	0
Oak Ridge National Laboratory	2,734	0	0	0	0
Oakland Operations Office					
Lawrence Berkeley National Laboratory	2,289	0	0	0	0
Richland Operations Office					
Pacific Northwest National Laboratory	3,376	0	0	0	0
All Other Sites a/	2,954	0	0	0	0
Subtotal	16,672	0	0	0	0
Adjustment	-2,358 b/	0	0	0	0
TOTAL	14,314 c/	0 d/	0 d/	0 d/	0 d/

a/ Funding provided to laboratories, universities, industry, other Federal agencies and other miscellaneous contractors.

b/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction was applied at the appropriation level.

c/ Excludes $109,000 which was transferred to the SBIR program and $12,000 which was transferred to the STTR program.

d/ This program was transferred to the Computational and Technology Research program in FY 1997.

ER LABORATORY TECHNOLOGY TRANSFER

I. **Mission Supporting Goals and Objectives:** The ER Laboratory Technology Transfer (TT) program links the basic science at ER national laboratories to applied technologies through leveraged collaborations with industries. The program is focused in critical technology research areas, e.g., intelligent manufacturing processes, tailored materials, and sustainable environments, to contribute technological innovations that will stimulate national economic growth, and to increase the return on the government investment in basic science. For example, research on intelligent processes such as sensor-computer-machine control systems will focus on high risk technological problems for ultimate commercial applications with high payoff. The potential for large payoff is based on the explosive growth in inexpensive computer technologies and the ability to incorporate them into control systems.

Research is conducted through peer-reviewed collaborations, including cost-shared Cooperative Research and Development Agreements (CRADAs), personnel exchanges, technology research and maturation projects, technical assistance/consultations to small business, and major government-industry partnerships with multiple partners. The program allows small business quick and easy access to technology at the energy laboratories with hundreds of small technical assistance projects each year.

Federal investment in public-private R&D partnerships is necessary to keep America competitive. There is no direct Federal funding of industry, the Federal investment has a clear benefit for both the government and industry, the unique knowledge in the energy laboratories forms the basis for the collaboration, and all projects are competitively selected based on peer review. The joint investments capitalize on two great strengths of this country: 1) the world class basic research of the National laboratories, and 2) the unparalleled entrepreneurial spirit of American industry.

ER LABORATORY TECHNOLOGY TRANSFER

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
ER Laboratory Technology Research	$ 16,672	$ 0	$ 0	$ 0	--
Total, ER Laboratory Technology Research	$ 16,672	$ 0	$ 0	$ 0	--

III. Performance Summary - Accomplishments:

	FY 1996	FY 1997	FY 1998
-Projects link the basic research advances of Office of Energy Research national laboratories to applied technologies through leveraged collaborations with industry. The program focuses on critical technology areas, including tailored materials, intelligent manufacturing, and sustainable environments. For example, research on intelligent manufacturing, such as sensor-computer-machine control systems, focused on high risk technological problems for ultimate commercial applications with high payoff. Approximately 65 multi-year collaborations between Energy Research national laboratories and industry were supported.	$ 16,672	$ 0	$ 0
-SBIR/STTR Funding	0	0	0

In FY 1996, $109,000 and $12,000 were transferred to the SBIR and STTR programs, respectively.

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

This program was transferred to the Computational and Technology Research program beginning in FY 1997.

ADVISORY AND OVERSIGHT PROGRAM DIRECTION

PROGRAM MISSION

This program was transferred to the Energy Supply Research and Development Program Direction decision unit in FY 1997. This program provided staffing resources needed to provide the Secretary with scientific and technical advice on DOE research and development projects, programs, plans and policies. Staff developed ER strategic plans; conducted independent technical assessments, peer reviews, and evaluations of specific programs and projects; represented ER on intra-agency working groups; provided interagency coordination on science and technology developments; and assessed the overall strength and vitality of the multiprogram laboratory system. They developed and coordinated departmental laboratory management policy and oversaw management processes such as strategic and institutional planning for multiprogram laboratories, laboratory appraisals, work by the laboratories for non-DOE sponsors, laboratory-directed research and development and spinoff technology transfer projects at the ER laboratories. The staff also managed activities related to infrastructure resource management including environment, safety and health support; general purpose facilities; general plant projects; and general purpose equipment in support of landlord responsibilities.

PERFORMANCE MEASURES:

Integration of Energy Research program plans with overall departmental plans.

Efficiencies in environment, safety and health procedures and improvements in pollution and compliance programs.

Improvements in staffing, travel and support services contractor utilization.

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- Funded in the Energy Supply Research and Development Program Direction decision unit in FY 1997 and FY 1998.
- Established the Laboratory Operations Board to increase the efficiency and productivity of the DOE laboratory system.
- Ensured the science and technology parts of the National Energy Policy Plan are achieved.

ADVISORY AND OVERSIGHT

PROGRAM FUNDING PROFILE
(Dollars in thousands)

Activity	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Request
Advisory and Oversight.....	$5,936	$0	$0	$0	$0
TOTAL, Advisory and Oversight.....	$5,936	$0	$0	$0	$0
Staffing (FTEs)	59	0	0	0	0

Public Law Authorization:
Pub. Law 95-91, DOE Organization Act

ADVISORY AND OVERSIGHT PROGRAM DIRECTION

(Tabular dollars in thousands, Narrative in whole dollars)

I. Mission Supporting Goals and Objectives

This program provided the Federal staffing and associated funding resources required to carry out the traditional science and technology responsibilities of the Office of Energy Research in accordance with the Department of Energy Organization Act (P.L. 95-91), including providing scientific and technical advice on DOE research and development projects, programs, plans, policies, and science and technology strategic planning; assessing and advising on the overall strength and vitality of the multiprogram laboratory system; infrastructure resource management activities; environment, safety and health support; and other responsibilities as mandated by the Secretary in areas beyond the scope of the other assigned Energy Research programs.

II. Funding Table:

	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Salaries and Benefits	$5,136	$0	$0	$0	$0
Travel	300	0	0	0	0
Support Services	400	0	0	0	0
Other Related Expenses	100	0	0	0	0
Total	$5,936	$0	$0	$0	$0

III. Performance Summary:

	FY 1996	FY 1997	FY 1998
Salaries and Benefits:			
Funded staff who carried out Energy Research's responsibilities for assessing and providing advice on the Department's research and development programs and the multiprogram national laboratories; overseeing infrastructure management activities; and providing environment, safety and health support, at staffing levels which were lower than those of previous years.	$5,136	$0	$0

III. Performance Summary:	FY 1996	FY 1997	FY 1998
Travel: Substantially reduced travel costs as part of the Department's streamlining efforts.	300	0	0
Support Services: Provided, at reduced levels, computer system development; environment, safety, and health; and administrative support.	400	0	0
Other Related Expenses: Provided computer hardware and software and other miscellaneous support for Advisory and Oversight funded staff.	100	0	0
Total	$5,936	$0	$0

EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:

This program is included in the Energy Supply Research and Development Program Direction decision unit beginning in FY 1997 at the direction of Congress.

Support Services	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Technical Support Service				
Feasibility of Design Considerations				
Economic and Environmental Analysis	125			
Test and Evaluation Studies				
Subtotal	125			
Management Support Services				
Management Studies				
Training and Education				
ADP Support	150			
Administrative Support Services	125			
Subtotal	275			
Total Support Services	400			
Use of Prior Year Balances				

Other Related Expenses	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Training				
Working Capital Fund				
Printing and Reproduction				
Rental Space				
Software Procurement/Maintenance Activities/Capital Acquisitions	75			
Other	25			
Total Obligational Authority	100			
Use of Prior-Year Balances				
Total Budget Authority	100			

POLICY AND MANAGEMENT-ENERGY RESEARCH

PROGRAM MISSION

This program was transferred to Energy Supply Research and Development Program Direction in FY 1997. This program provided the staffing resources and associated funding required to provide overall direction of the Office of Energy Research responsibilities carried out under the following programs: High Energy Physics, Nuclear Physics, Biological and Environmental Research, Fusion Energy, Basic Energy Sciences, Energy Research Analyses, Multiprogram Energy Laboratories-Facilities Support, and the DOE-wide Small Business Innovation Research and Small Business Technology Transfer Programs.

In addition to directing the Office's research programs, the Director of Energy Research also serves as the Department's science and technology advisor for formulation and implementation of basic research policy. In this capacity, the Director provides independent reviews, analyses and recommendations concerning a wide range of activities which require scientific counsel. These activities include national research and development strategies, plans and policies, including the establishment of budgetary priorities for energy research and development programs and advising on policy issues regarding the best utilization of the DOE multiprogram laboratories.

PERFORMANCE MEASURES:

Efficiency and effectiveness of the Office of Energy Research's research and development in all program areas.

Responsiveness to national science policy and initiatives.

Effectiveness in support of Departmental plans and operations.

Effectiveness and efficiency of administrative responsibilities.

POLICY AND MANAGEMENT-ENERGY RESEARCH

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- Program shifted to be a part of Energy Supply Research and Development Program Direction in FY 1997.
- Increased efforts to improve international participation on mutual benefit research and development projects.
- Increased productivity of all of the Office of Energy Research's programs.
- Implemented a strategic plan that maximizes productivity while streamlining processes.

POLICY AND MANAGEMENT

PROGRAM FUNDING PROFILE
(Dollars in thousands)

Activity	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Request
Policy and Management.....	$2,116	$0	$0	$0	$0
TOTAL, Policy and Management.....	$2,116	$0	$0	$0	$0
Staffing (FTEs)	18	0	0	0	0

Public Law Authorization:
Pub. Law 95-91, DOE Organization Act

POLICY AND MANAGEMENT-ENERGY RESEARCH

(Tabular dollars in thousands, narrative in whole dollars)

I. Mission Supporting Goals/Ongoing Responsibilities

The program provided the staffing resources and associated costs of the immediate Office of the Director of Energy Research, which provides overall direction of the Office of Energy Research responsibilities carried out under the following programs: High Energy Physics, Nuclear Physics, Biological and Environmental Research, Fusion Energy Sciences, Basic Energy Sciences, Energy Research Analyses, Multiprogram Energy Laboratories-Facilities Support, Computational and Technology Research, and the DOE-wide Small Business Innovation Research and Small Business Technology Transfer Programs. This activity is budgeted in the Energy Supply Research and Development Program Direction decision unit in FY 1997 and FY 1998.

II. Funding Table:

	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Salaries and Benefits	$1,690	$0	$0	$0	$0
Travel	175	0	0	0	0
Support Services	100	0	0	0	0
Other Related Expenses	151	0	0	0	0
Total	$2,116	$0	$0	$0	$0

III. Performance Summary:

	FY 1996	FY 1997	FY 1998
Salaries and Benefits:	$1,690	$0	$0

Staff provided effective leadership of Energy Research programs during a period of stable research and development programs, but declining Federal staffing.

III. Performance Summary:

	FY 1996	FY 1997	FY 1998
Travel: Provided for travel at a reduced rate consistent with the Department's streamlining objectives.	175	0	0
Support Services: Support for Energy Research's activity based costing/management effort as well as information systems development.	100	0	0
Other Related Expenses: Provided hardware and software for information technology improvements and other miscellaneous costs in support of the Office of the Director.	151	0	0
Total	$2,116	$0	$0

EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:

This program has been incorporated in the Energy Supply Research and Development Program Direction decision unit beginning in FY 1997 at the direction of Congress.

Support Services	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Technical Support Service				
Feasibility of Design Considerations				
Economic and Environmental Analysis				
Test and Evaluation Studies				
Subtotal				
Management Support Services				
Management Studies				
Training and Education				
ADP Support	40			
Administrative Support Services	60			
Subtotal				
Total Support Services	100			
Use of Prior Year Balances				

Other Related Expenses	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Training				
Working Capital Fund				
Printing and Reproduction				
Rental Space				
Software Procurement/Maintenance Activities/Capital Acquisitions	41			
Other	110			
Total Obligational Authority	151			
Use of Prior-Year Balances				
Total Budget Authority	151			

UNIVERSITY AND SCIENCE EDUCATION

PROGRAM MISSION

The University and Science Education (USE) program supported activities that utilized the scientific and technical resources of the Department of Energy's laboratories to enhance the development of a diverse, well-educated and scientifically literate workforce. USE's centralized institutional support for the Department's education efforts enabled all DOE research and technical programs to provide hands-on research experiences for students and faculty at the Department's laboratories at minimum Department-wide administrative cost. This program was terminated in FY 1997 in accordance with Congressional direction.

The Office of Laboratory Policy and Infrastructure Management, which reports to the Director of the Office of Energy Research, managed the USE program. The program office was responsible for providing leadership and program support necessary to use and leverage the resources of the Department's laboratories to help replenish the pool of scientists and engineers, and to achieve significant, long-term improvements in their scientific and technological skills, primarily through hands-on research experiences at the laboratories.

The GOAL of the University and Science Education program was to:

Ensure that the Department effectively utilizes and leverages the resources of the DOE laboratory-based system to support it's university and science education mission.

The OBJECTIVES related to this goal were to:

1. Provide opportunities and effective mechanisms for students and faculty to utilize the Department's laboratories for hands-on research experiences.

2. Support increased participation of underrepresented populations in science and engineering.

PROGRAM MISSION–UNIVERSITY AND SCIENCE EDUCATION (Cont'd)

3. Utilize DOE laboratory resources to contribute to systemic science education reform.

4. Provide the necessary infrastructure for the Department's laboratory-based science education programs.

PERFORMANCE MEASURES:

Performance measures for the University and Science Education program are both qualitative and quantitative. The quality of the program was measured by improvement in performance of the DOE Laboratory Science Education Programs. The program performance measures were:

1. Enhanced opportunities at DOE laboratories to improve students/faculty understanding of science and mathematics.

2. Increased flow of underrepresented students into science and math programs/careers achieved.

3. Cost sharing for program initiatives.

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- By Congressional direction, this program was terminated in FY 1997.

- In accordance with Congressional direction in FY 1996 the University and Science Education program was restructured to concentrate the educational effort in the national laboratories. The new efforts built upon and enhanced our core strength of providing state-of-the-art real world hands on experience to students and faculty.

- Through the Science and Engineering Research Semester (SERS) program, approximately 300 undergraduates spent an academic term working side-by-side with scientists at DOE's national laboratories. In addition to gaining valuable research experience, these students helped DOE scientists advance their ongoing research.

PROGRAM MISSION–UNIVERSITY AND SCIENCE EDUCATION (Cont'd)

- The infrastructure supported by the Laboratory Cooperative Program enabled nearly 2000 college and university faculty and students to participate in collaborative hands-on research with the scientists from DOE's national laboratories. Participants in these programs brought fresh ideas to the Department's research endeavors, and carried "state-of -the-art" knowledge and experience from our laboratories back to their university and academic programs.

- Training provided by the laboratories through Laboratory Cooperative Program workshops and conferences provided 1500 college-level participants with new skills in developing areas of science such as parallel computation, an area of computer science in which the laboratories have played a leading role.

- Over 90 undergraduate students and 30 faculty involved in DOE-laboratory partnership efforts with Historically Black Colleges and Universities (HBCU) and other minority institutions participated in hands-on research with DOE laboratory scientists.

- Precollege activities that capitalize on leveraged previous investments and partnerships, and summer and academic laboratory-based research assignments were continued. While laboratory-based programs are our highest priority, the severity of the FY 1996 budget reductions required cutbacks in faculty and student intern and collaborative research appointments at the laboratories. No new university postdoctoral research fellows at the laboratories were appointed and substantial reductions were taken in support for minority and outreach efforts.

UNIVERSITY AND SCIENCE EDUCATION
PROGRAM FUNDING PROFILE
(Dollars in thousands)

Subprogram	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Laboratory Cooperative Program	$13,327	$0	$0	$0	$0
University Programs	5,925	0	0	0	0
Program Direction	814 a/	0	0	0	0
Subtotal, University and Science Education	20,066	0	0	0	0
Adjustment	-1,145 b/	0	0	0	0
Total, USE	$18,921	$0	$0	$0	$0

a/ $813,555 was made available for University and Science Education staff severance costs.

b/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

Public Law Authorization:

Pub. Law 95-91, DOE Organization Act

UNIVERSITY AND SCIENCE EDUCATION
(Dollars in thousands)

PROGRAM FUNDING BY SITE

Field Offices/Sites	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Albuquerque Operations Office					
Inhalation Toxicology Research Institute	$20	$0	$0	$0	$0
Los Alamos National Laboratory	579	0	0	0	0
Sandia National Laboratory	1,279	0	0	0	0
Chicago Operations Office					
Ames Laboratory	95	0	0	0	0
Argonne National Laboratory	2,550	0	0	0	0
Brookhaven National Laboratory	745	0	0	0	0
Fermi National Accelerator Laboratory	355	0	0	0	0
Princeton Plasma Physics Laboratory	300	0	0	0	0
Golden Field Office					
National Renewable Energy Laboratory	50	0	0	0	0
Idaho Operations Office					
Associated Western Universities	2,384	0	0	0	0
Idaho National Engineering Laboratory	120	0	0	0	0
Oakland Operations Office					
Lawrence Berkeley National Laboratory	1,069	0	0	0	0
Lawrence Livermore National Laboratory	677	0	0	0	0
Stanford Linear Accelerator Center	80	0	0	0	0
Oak Ridge Operations Office					
Thomas Jefferson National Accelerator Facility	150	0	0	0	0
Oak Ridge Institute for Science and Education	4,438	0	0	0	0
Oak Ridge National Laboratory	795	0	0	0	0
Ohio Field Office					
EG&G Mound App. Technology	72	0	0	0	0
Richland Operations Office					
Pacific Northwest National Laboratory	410	0	0	0	0
Savannah River Operations Office					
Savannah River Ecology Laboratory	100	0	0	0	0
Savannah River Tech. Center	5	0	0	0	0
All other sites a/	3,793	0	0	0	0
Subtotal	20,066	0	0	0	0
Adjustment	-1,145 b/	0	0	0	0
TOTAL	$18,921	$0	$0	$0	$0

a/ Funding provided to universities, industry, other federal agencies and contractors.

b/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

UNIVERSITY AND SCIENCE EDUCATION
(Tabular dollars in thousands, narrative in whole dollars)

I. **Mission Supporting Goals and Objectives:** Activities supported by University and Science Education programs ensured the effective utilization of DOE's laboratory system in support of the Department's university and science education mission by enhancing the capabilities of faculty and students through hands-on research experiences at DOE national laboratories; increasing the diversity of the scientific workforce; utilizing laboratory resources to contribute to systemic science education reform; and providing the infrastructure for the Department's laboratory-based science education programs.

Laboratory Cooperative Program

The Laboratory Cooperative Program was the Department's primary vehicle for providing faculty and students from every state in the United States access to its national laboratories. The program provided participants, from both small colleges, including predominately minority institutions, and large universities with access to state-of-the-art scientific equipment, with techniques and ideas that enabled them to further develop their critical thinking and analytical skills. The laboratory-based institutional support provided by the Laboratory Cooperative Program ensured effective participant placement across all of DOE's research and technical program areas and monitored the quality of their research experiences. Minority students and faculty were particularly sought out and encouraged to participate in the Laboratory Cooperative Program. From the many thousands of applications the Laboratory Cooperative Program received annually, it was clear that DOE's research participation appointments were highly regarded and that these opportunities played an important role in the science education program of the country.

University Programs

The University Programs included support for university-based efforts directed at encouraging more young people, including minorities and women, to pursue energy-related scientific and technical careers. Support was requested to sustain DOE laboratory/minority university alliances as well as other Administration and Congressionally recommended efforts to provide partnership opportunities with colleges and universities, federal, state, and local agencies.

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Laboratory Cooperative Program	$13,327	$ 0	$ 0	$ 0	--
University Programs	5,925	0	0	0	--
Program Direction	814	0	0	0	--
Total	$20,066	$ 0	$ 0	$ 0	--

III. Performance Summary-Accomplishments

	FY 1996	FY 1997	FY 1998
Laboratory Cooperative Program			
In FY 1996 nearly 300 undergraduates spent an academic term working side-by-side with scientists at seven of DOE's national laboratories.	$3,040	$ 0	$ 0
In FY 1996, the infrastructure supported by the Laboratory Cooperative Program enabled over 3,700 college and university faculty and students to participate in collaborative hands-on research with scientists from DOE's national laboratories. Approximately 60 percent of the participants were supported with funds provided by the research areas at the laboratories. In addition, training provided through the Program's workshops and conferences supported an additional 1,500 college-level participants in gaining new skills in developing areas of science.	5,324	0	0

	FY 1996	FY 1997	FY 1998
Funds were provided for laboratory-based research participation activities in precollege science education outreach projects. In FY 1997 and FY 1998 funding for all activities in this area will be eliminated.	1,833	0	0
No new postdoctoral research fellows were appointed at the laboratories in FY 1996. No additional funding will be available in FY 1997 and FY 1998 and this highly successful program was terminated.	1,100	0	0
Funding provided for program evaluation, data collection, electronic/other information dissemination, and general support required to maintain program integrity. In FY 1997 and FY 1998 these efforts are terminated.	2,030	0	0
Total Laboratory Cooperative Program	$13,327	$0	$0
University Programs			
A long-term alliance among three DOE national laboratories, a Historically Black College and University (HBCU), two Hispanic serving institutions (HSIs) and four Native American serving institutions were reduced.	1,175	0	0
In FY 1996, funds were provided to support the Science Consortium, a partnership involving Jackson State University, the Ana G. Mendez Foundation and Lawrence Berkeley Laboratory.	600	0	0
Programs were funded in FY 1996, which benefitted faculty and students from Historically Black Colleges and Universities and other minority institutions.	1,877	0	0

	FY 1996	FY 1997	FY 1998
University based efforts supported in FY 1996 to foster partnerships in precollege activities were terminated in FY 1997 and FY 1998.	2,273	0	0
Total University Programs	$5,925	$0	$0
Program Direction			
Program direction resources of $813,555 were utilized to terminate the 20 FTEs associated with this program per Congressional direction in the FY 1996 Conference Report.	814	0	0
Total University and Science Education	$20,066	$0	$0

Explanation of Funding Changes FY 1997 to FY 1998:

This program was terminated in FY 1997 in accordance with Congressional direction.

MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT

PROGRAM MISSION

The Multiprogram Energy Laboratories - Facilities Support (MEL-FS) program provides line item construction funding to support the general purpose infrastructure of the Energy Research's five multiprogram national laboratories. These are: Argonne National Laboratory - East (ANL-E), Brookhaven National Laboratory (BNL), Lawrence Berkeley National Laboratory (LBNL), Oak Ridge National Laboratory (ORNL), and Pacific Northwest National Laboratory (PNNL). These laboratories have over 1,100 buildings with 14.3 million gross square feet of space and an estimated replacement value of over $9,000,000,000. All facilities at these laboratories are government-owned, contractor-operated (GOCO). Total operating funding for these laboratories is over $3,000,000,000 a year. The Office of Energy Research manages this program to provide a comprehensive, prioritized and equitable approach to its stewardship responsibility for the general purpose support infrastructure of these laboratories.

The GOAL of the MEL-FS program is:

To ensure that the multiprogram laboratories' support facilities can meet the Department's research needs primarily by refurbishing or replacing deteriorated, outmoded, unsafe, and inefficient general purpose infrastructure.

The OBJECTIVES related to these goals are:

1. To correct environment, safety and health (ES&H) inadequacies.
2. To reduce risk of operational interruptions due to failed support systems.
3. To provide cost effective operations and reduce maintenance costs.
4. To provide quality space for multiprogram research and support activities.
5. To preserve the government investment in the physical plant of the laboratories.
6. To promote performance based infrastructure management.

PROGRAM MISSION - MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT (Cont'd)

PERFORMANCE MEASURES:

Performance measures related to the MEL-FS program are continuously being refined to ensure that they: 1) incorporate external/internal customers' inputs; 2) drive performance; 3) address the strategic plan; and 4) focus on the effectiveness of the laboratory system. Current performance measures include:

1. Support line item construction funding to reduce risk, ensure continuity of operations, avoid or save costs and increase productivity.

   Expectation: Fund highest priority needs based on scoring from Life Cycle Asset Management (LCAM) Cost-Risk-Impact Matrix.

2. Overall condition of laboratory buildings

   Expectation: Percentage of facilities rated adequate.

3. Excellence in project management

   Expectation: Percentage of projects completed within baseline cost and schedule.

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- Progress in Line Item Projects - Nine projects were completed in FY 1996. Three projects are scheduled for completion in FY 1997. The three projects scheduled for completion in FY 1998 are the Loss Prevention Upgrades at Brookhaven National Laboratory, Phase III Fire Safety Improvements at Argonne National Laboratory, and the Sanitary Sewer Restoration Phase I at Lawrence Berkeley National Laboratory.

- Beginning with FY 1997 this program no longer funds ES&H inadequacies with operating funds consistent with FY 1997 Congressional direction.

MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT

PROGRAM FUNDING PROFILE
(Dollars in thousands)

Subprogram	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Request
Infrastructure Support	$6,506	$0	$0	$0	$0
Subtotal	$6,506	$0	$0	$0	$0
Construction	27,538	21,260	0	21,260	40,267
Subtotal Multiprogram Energy Laboratories - Facilities Support	$34,044	$21,260	$0	$21,260	$40,267
Adjustment	-4,352 a/	-107 b/	0	-107 b/	
TOTAL, MEL-FS	$29,692 c/	$21,153	$0	$21,153	$40,267 d/

a/ $4,352,068 was recovered from prior year projects. Those funds were distributed as follows: $800,900 was added to FY 1996 line item funding; $3,476,168 was used to offset the general reduction for use of prior year balances; and $75,000 was provided for Indian Energy Resources programs.

b/ Share of Energy Supply, Research and Development general reduction assigned to this program. The total general reduction is applied at the appropriation level.

c/ Excludes $135,000 which was transferred to the SBIR program and $10,000 which was transferred to the STTR program.

d/ Includes $19,007,000 of up front funding for FY 1999-2002 fixed assets requirements for Multiprogram Energy Laboratories Infrastructure Project, Multipgrogram Energy Laboratories Upgrades, and Roofing Improvements.

Public Law Authorizations:

Public Law 95-91, "Department of Energy Organization Act"

MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT

(Dollars in thousands)

PROGRAM FUNDING BY SITE

Field Offices/Sites	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Request
Chicago Operations Office					
Argonne National Lab (East)	$8,762	$4,868	$0	$4,868	$17,321
Brookhaven National Laboratory	9,907	11,932	0	11,932	568
Oakland Operations Office					
Lawrence Berkeley National Laboratory	6,243	0	0	0	6,500
Oak Ridge Operations Office					
Oak Ridge National Laboratory	4,134	0	0	0	15,878
Richland Operations Office					
Pacific Northwest National Laboratory	4,740	4,353	0	4,353	0
All Other Sites a/	258	107	0	107	0
Subtotal	34,044	21,260	0	21,260	40,267
Adjustment	-4,352 b/	-107 c/	0	-107 c/	0
TOTAL	$29,692 d/	$21,153	$0	$21,153	$40,267

a/ Funding provided to industry, other Federal agencies and contractors.

b/ $4,352,068 was recovered from prior year projects. Those funds were distributed as follows: $800,900 was added to FY 1996 line item funding; $3,476,168 was used to offset general reduction for use of prior year balances: and $75,000 was provided for Indian Energy Resources programs.

c/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total reduction is applied at the appropriation level.

d/ Excludes $135,000 which was transferred to the SBIR program and $10,000 which was transferred to the STTR program.

Public Law Authorizations:

Public Law 95-91, "Department of Energy Organization Act"

MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT
INFRASTRUCTURE SUPPORT

I. **Mission Supporting Goals and Objectives**: The Environment, Safety and Health (ES&H) Support activities provided support to correct the highest priority ES&H deficiencies identified in the ES&H Management Plan. Deficiencies have been identified in the environmental area (e.g., air, water, hazardous materials), and in occupational safety and health, fire protection, emergency preparedness, safety and hazards analyses, conduct of operations, configuration management, work practices and radiation protection.

II. **Funding Schedule**:

Program Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Infrastructure Support					
Environment, Safety & Health Support . .	$6,506	$ 0	$ 0	$ 0	.0%
Total, Infrastructure Support	$6,506	$ 0	$ 0	$ 0	.0%

III. **Performance Summary - Accomplishments:**

	FY 1996	FY 1997	FY 1998
- Supported highest priority actions and compliance issues including electrical service upgrades, natural hazard mitigation, asbestos characterization and remediation, worker safety enhancement, fuel storage and transfer facility upgrade, fire and life safety vegetation management, seismic safety engineering upgrades, laser access control, communication equipment upgrades, nuclear criticality safety upgrades.	$6,506	$0	$0
Total Infrastructure Support	$6,506	$0	$0

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

Not applicable.

MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT

CONSTRUCTION

I. **Mission Supporting Goals and Objectives**: This subprogram supports the program's goal to ensure that the multiprogram laboratories' support facilities can meet the Department's research needs primarily by refurbishing or replacing deteriorated, outmoded, unsafe, and inefficient general purpose infrastructure. This is accomplished by refurbishing or replacing inadequate general purpose facilities and infrastructure that support research needs. Facility deficiencies are due to age, obsolescence, extensive use and changing requirements, including Environment, Safety and Health (ES&H) requirements. This subprogram achieves this by funding line item construction projects (i.e., projects with a total estimated cost of $2,000,000 or above) for general purpose facilities. General purpose facilities are general use, service and support facilities such as administrative space, cafeterias, general office/laboratory space, utility systems, sanitary sewers, roads, etc. There are over 1,100 buildings at the five multiprogram laboratories covered by this program. These buildings have over 14.3 million gross square feet of space. Approximately half of the space is considered fully adequate, while the remainder needs rehabilitation or replacement/demolition. The large percentage of inadequate space reflects the age of the facilities (average age of 33 years), changing research needs that require more office space and light laboratory space, environmental, safety and health requirements and obsolete systems.

Capital investment requirements are identified in laboratory Institutional Plans which address needs through year 2001 based on expected programmatic support. The project needs through the period total over $425,000,000. Forty one percent of this amount is to rehabilitate or replace buildings; 35% is for utility projects; and 24% for environment, safety and health projects. All projects are first ranked using a prioritization model that takes into account risk, impacts, and mission need. The projects that have environment, safety and health as the principal driver are further prioritized using the Risk Prioritization Model from the DOE ES&H Management Plan process.

MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT

CONSTRUCTION

II. Funding Schedule:

Program Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
General Purpose Facilities	$13,064	$ 6,960	$19,320	$+12,360	+177.6%
ES&H	14,474	14,300	20,947	+6,647	+46.0%
Total, Construction	$27,538	$21,260	$40,267	$+19,007	89.4%

III. Performance Summary - Accomplishments: Construction	FY 1996	FY 1997	FY 1998
- Supports completion/continuation of General Purpose. Facility subprojects. Support the initiation of one new General Purpose Facility subproject - Upgrade Steam Plant at ORNL under the combined Multiprogram Energy Laboratories Infrastructure Project (MEL-001).	$13,064	$ 6,960	$19,320
- Support completion/continuation of Environment, Safety and Health subprojects consistent with planned schedules. Support the initiation of 2 new Environment, Safety and Health subprojects: the Electrical System Rehab., Phase IV at LBNL and Electrical System Upgrade, Phase III at ANL under the combined Multiprogram Energy Laboratories Infrastructure Project (MEL-001).	14,474	14,300	20,947
Total Construction	$27,538	$21,260	$40,267

MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT

CONSTRUCTION

EXPLANATION OF FUNDING CHANGES FROM FY 1997 to FY 1998:

Increase in funding reflects full funding of FY 1999-2002 fixed asset requirements for projects funded in FY 1998.	$+19,007,000
Total Funding Change, Construction	$+19,007,000

MULTIPROGRAM ENERGY LABORATORIES - FACILITIES SUPPORT
CAPITAL OPERATING EXPENSES & CONSTRUCTION SUMMARY
(Dollars in thousands)

	FY 1996	FY 1997	FY 1998	$ Change	% Change
Capital Operating Expenses					
Capital Equipment (total)	$106	$0	$0	$0	--

Construction Project Summary (Construction Funded)

Project No.	Project Title	TEC	Previous Appropriated	FY 1996 Appropriated	FY 1997 Appropriated	FY 1998 Request	Unapprop. Balance
MEL-001	Multiprogram Energy Laboratories Infrastructure Project	N/A	N/A	N/A	N/A	$19,420	$0
96-E-333	Multiprogram Energy Laboratories Upgrades, Various Locations	17,365	0	4,400	7,424	5,541	0
95-E-308	Sanitary System Mods, II, BNL	4,250	960	1,690	1	568	0
95-E-307	Fire Safety Improvements, III, ANL-E	3,003	210	1,075	1,000	718	0
95-E-301	Central Heat Plant Rehab, I, ANL-E	9,880	1,307	2,631	2,500	3,442	0
94-E-363	Roofing Improvements, ORNL	16,000	3,333	2,089	0	10,578	0
Total Multiprogram Energy Laboratories - Facilities Support		XXXXX	XXXXX	XXXXX	XXXXX	$40,267	$0

Department of Energy
FY 1998 Congressional Budget Request
Energy Assets Acquisition

MEL-FS Project Data Sheets
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DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST

(Tabular dollars in thousands. Narrative material in whole dollars.)

Multiprogram Energy Laboratories - Facilities Support

1. Title and Location of Project:	Multiprogram Energy Laboratories Infrastructure Project Various Locations	2a. Project No. MEL-001 2b. Construction Funded
3a. Date A-E Work Initiated, (Title I Design Start Scheduled): Varies by subproject 3b. A-E Work (Title I & II) Duration: 6-12 Months		5. Previous Cost Estimate: Total Estimated Cost (TEC) -- N/A Total Project Cost (TPC) -- N/A
4a. Date Physical Construction Starts: See subproject details 4b. Date Construction Ends: See subproject details		6. Current Cost Estimate: TEC -- N/A TPC -- N/A

7. Financial Schedule: (Federal Funds)

Fiscal Year	Appropriation	Obligations	Cost
FY 1998	$ 19,420	$ 7,259	$ 3,600
FY 1999	0	12,000	7,500
FY 2000	0	161	5,920
FY 2001	0	0	2,400

1. Title and Location of Project:	Multiprogram Energy Laboratories Infrastructure Project Various Locations	2a. Project No. MEL-001 2b. Construction Funded

8. Project Description, Justification and Scope

This project funds two types of subprojects:

- Projects to correct ES&H deficiencies including fire safety improvements, sanitary system upgrades and electrical system replacements; and

- Projects that renovate or replace inefficient and unreliable general purpose facilities (GPF) including general use, service and support facilities such as administrative space, cafeterias, utility systems, and roads.

General Purpose Facility Projects:

a. Subproject 01 - Upgrade Steam Plant, ORNL

TEC	Prev.	FY 1996	FY 1997	FY 1998	Outyear	Construction Start - Completion Dates
5,300	----	0	0	5,300	0	1st Qtr FY 1998 - 4th Qtr. FY 1999

This project will upgrade the ORNL steam plant by adding a new steam boiler of approximately 100,000 pounds per hour capacity and capable of burning both natural gas and fuel oil. The boiler will be procured with all necessary ancillary equipment, such as blowers, feedwater pumps, and controls. Suitable weather protection will be provided.

This project is needed because of the age of the five existing boilers. Three are 46 years old, one is 44 years old, and the fifth is 32 years old. The new boiler capacity will allow decreased firing time on the oldest boilers and will extend their useful life. In addition, the new boiler will improve the efficiency of the steam plant.

1.	Title and Location of Project:	Multiprogram Energy Laboratories Infrastructure Project Various Locations	2a. Project No. MEL-001 2b. Construction Funded

8. Project Description, Justification and Scope

ES&H PROJECTS:

a. Subproject 02 - Electrical Systems Rehab. Phase IV, (LBNL)

TEC	Prev.	FY 1996	FY 1997	FY 1998	Outyear	Construction Start - Completion Dates
6,500	---	0	0	6,500	0	2nd Qtr FY 1998 - 4th Qtr FY 2000

The Blackberry Switching Station Replacement Project is the last major planned rehabilitation to the LBNL electrical power system, maintain its reliability and improve its safety. The project will upgrade the existing 12 kV power system and utilize circuit breakers installed in the FY 1987 MEL-FS project improvement to the main Grizzly Substation.

The project will correct existing deficiencies in the power distribution system that serves the Blackberry Canyon Service Area. The improvements will replace the existing electrical system, which consists of aged and underrated electrical equipment, 20 to 30 years old in many instances, that is difficult to maintain and unsafe to operate. It will provide the Laboratory with increased operational flexibility as well as improvements in reliability, maintainability and safety.

b. Subproject 03-Electrical System Upgrade, Phase III, (ANL)

TEC	Prev.	FY 1996	FY 1997	FY 1998	Outyear	Construction Start - Completion Dates
7,620	---	0	0	7,620	0	2nd Qtr FY 1998 - 1st Qtr FY 2001

The project provides for the upgrade of the main electrical substation at Facility 543 and Facility 549A.

The work consists of the following items: install a new 138 kV overhead steel pole transmission line and upgrade the existing transmission line, relocate an existing transformer, upgrade existing transformers, replace existing 13.2 kV outdoor switchgear, and replace existing oil circuit breaker.

1.	Title and Location of Project:	Multiprogram Energy Laboratories Infrastructure Project Various Locations	2a. Project No. MEL-001 2b. Construction Funded

The intended project will accomplish several objectives related to system reliability, personnel safety, environmental hazards, risk reduction and system expansion.

9. Details of Cost Estimate

Based on preliminary or conceptual design.

10. Method of Performance

Design will be by negotiated architect-engineer contracts or laboratory personnel. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

(Tabular dollars in thousands. Narrative material in whole dollars.)

Multiprogram Energy Laboratories - Facilities Support

1. Title and Location of Project: Multiprogram Energy Laboratories Upgrades
Various Locations

2a. Project No. 96-E-333
2b. Construction Funded

3a. Date A-E Work Initiated, (Title I Design Start Scheduled): Varies by subproject

3b. A-E Work (Title I & II) Duration: 6-12 Months

5. Previous Cost Estimate:
Total Estimated Cost (TEC) -- $17,365
Total Project Cost (TPC) -- $17,510

4a. Date Physical Construction Starts: See subproject details

4b. Date Construction Ends: See subproject details

6. Current Cost Estimate:
TEC -- $17,365
TPC -- $17,510

7. Financial Schedule: (Federal Funds)

Fiscal Year	Appropriation	Adjustments	Obligations	Cost
FY 1996	4,400		4,400	675
FY 1997	7,424		7,424	4,400
FY 1998	5,541		5,273	6,500
FY 1999	0		268	4,782
FY 2000	0		0	1,008

1. Title and Location of Project:	Multiprogram Energy Laboratories Upgrades Various Locations	2a. Project No. 96-E-333 2b. Construction Funded

Project Description, Justification and Scope

This project funds subprojects to correct ES&H deficiencies:

a. Subproject 01 - Building Electrical Service Upgrade, I (ANL)

TEC	Prev.	FY 1996	FY 1997	FY 1998	Outyear	Construction Start - Completion Dates
7,885	7,617	1,200	1,144	5,541	0	2nd Qtr FY 1997 - 4th Qtr FY 1999

This project will provide the most urgently needed replacement of emergency generators and the upgrade of building's main electrical services (circuit breaker retrofits, bus duct replacement and emergency generator replacements) that are no longer adequate, reliable, efficient, or in accordance with existing electrical codes/standards and environment, safety and health standards.

Failure to fund this project would increase frequency and duration of general maintenance resulting in increased parts and labor costs, negative impact on scientific programs and non-compliance with safety regulations.

b. Subproject 02 - Hot Lab Renovation, Bldg 801 (BNL)

TEC	Prev.	FY 1996	FY 1997	FY 1998	Outyear	Construction Start - Completion Dates
7,080	--	800	6,280	0	0	2nd Qtr FY 1997 - 4th Qtr FY 1998

This project, in the west side of Building 801 (the Hot Lab), is part of a comprehensive effort to: upgrade the production of radionuclides and radiopharmaceuticals for supply to the pharmaceutical/medical community outside the laboratory; upgrade major research program leading to new and more effective diagnostic and therapeutic agents; comply with DOE Order 5820.2A, which requires that the generation of low-level radioactive waste be reduced; and bring Brookhaven National Laboratory (BNL) into conformance with Federal, state, and local environmental laws and regulatory requirements. The unique location of BNL over an EPA designated "sole-source" aquifer has heightened regulatory concern over potential ground water contamination from BNL facilities.

Failure to fund this project would increase the potential for ground water contamination and non-compliance with safety regulations.

8. Project Description, Justification and Scope (Continued)

c. Subproject 03 - Sanitary Sewer Restoration Phase I (LBNL)

TEC	Prev.	FY 1996	FY 1997	FY 1998	Outyear	Construction Start - Completion Dates
2,400	--	2,400	0	0	0	3rd Qtr FY 1997 - 4th Qtr FY 1998

Portions of the underground sanitary sewer system will be replaced based upon video camera surveys of site sanitary sewer lines, including approximately 3,480 feet of sanitary sewer lines ranging in diameter from three (3) inches to eight (8) inches. Soil samples will be tested during construction for possible contamination. All excavated material that is contaminated will be either remediated or removed to an authorized hazardous waste site.

Failure to fund this project would increase the potential for ground water contamination, excessive maintenance costs, and non-compliance with safety regulations.

9. Details of Cost Estimate

Based on preliminary or conceptual design.

10. Method of Performance

Design will be by negotiated architect-engineer contracts or laboratory personnel. To the extent feasible, construction and procurement will be accomplished by fixed-price contracts awarded on the basis of competitive bids.

DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST

(Tabular dollars in thousands. Narrative material in whole dollars.)

Multiprogram Energy Laboratories - Facilities Support
Multiprogram Energy Laboratories - Environment, Safety and Health Support

1. Title and location of project: Sanitary System Modifications, Phase II
Brookhaven National Laboratory
Upton, New York

2a. Project No. 95-E-308
2b. Construction Funded

3a. Date A-E Work Initiated, (Title I Design Start Scheduled): 1st Qtr. FY 1994

3b. A-E Work (Title I & II) Duration: 10 Months

5. Previous Cost Estimate:
Total Estimated Cost (TEC) -- $4,250
Total Project Cost (TPC) -- $4,300

4a. Date Physical Construction Starts: 1st Qtr. FY 1996

4b. Date Construction Ends: 4th Qtr. FY 1998

6. Current Cost Estimate:
TEC -- $ 4,250
TPC -- $ 4,300

7. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1995	$ 960	$ 960	$ 530
1996	1,690	1,690	254
1997	1,032	1,032	1,300
1998	568	568	1,000
1999	0	0	1,166

1.	Title and location of project:	Sanitary System Modifications, Phase II Brookhaven National Laboratory Upton, New York	2a. Project No. 95-E-308 2b. Construction Funded

8. Project Description, Justification and Scope

This project is the second phase of the upgrade of the laboratory sanitary waste system. Major operational systems of the waste treatment plant were upgraded and about 3,500 linear feet of defective sewer lines and 26 manholes upstream of the treatment plant were replaced. This phase continues with replacement of 7,500 l.f. defective sewer lines and implements additional treatment plant process and building improvements.

Included in this second phase are the following upgrades:

a. Replacement or rehabilitation of approximately 7,500 linear feet of defective sewer pipe with cement-lined ductile iron, heavy wall PVC pipe or polyethylene linear. The pipe size varies from 6 inches to 30 inches.
b. Hyperchlorite Building (No. 576) - demolish plywood structure and replace with masonry structure.
c. Barminator Building (No. 583) - demolish plywood structure and replace with masonry structure.
d. Influent Measuring Building (No. 584) - demolish plywood structure and replace with masonry structure.
e. Service Building (No. 575) - replace adjacent lunch and spare parts trailer with masonry addition.
f. Install modular aeration tank for secondary treatment.
g. Install ultra-violet (UV) disinfection system.
h. Install tertiary treatment system to reduce nitrogen in STP effluent.

Deteriorating Sewer Lines and Manholes

The laboratory is situated over Long Island's sole source aquifer. The 1990 Tiger Team Assessment states "...sound environmental management practices dictate that sewage collection systems be repaired and maintained to minimize contamination of soils and groundwater through sewer lines exfiltration or, conversely, to prevent overloading of waste treatment facilities due to infiltration of storm water." A video inspection of the sewage collection system, conducted in 1988, identified areas where pipes were cracked, broken, and in some cases, nearly collapsed. Root intrusion is prevalent and some lines contain dips or may slope the wrong way giving rise to areas, which are continually flooded and contain standing debris. Most of the lines are vitrified tile with joints at 4 foot intervals. Twenty-six defective sanitary manholes were also identified.

8. Project Description, Justification and Scope (Continued)

To generally eliminate or minimize present and future exfiltration to the groundwater and infiltration to the sewage collection system, existing defective sewer piping will be replaced with approximately 7,500 linear feet of new cement lined ductile iron or heavy wall PVC, or polyethylene liner from manhole to manhole. Piping will be installed in 18 to 20 foot lengths and be connected with the highest quality gasketed joints. Installation of 3,500 l.f. of piping has been completed under this project and an additional 4,000 l.f. will be completed with funding received in FY 1998.

Wastewater Treatment Plant Building Improvements

Building Nos. 576, 583 and 584 are plywood structures that do not presently meet the standards of the New York State Building Code and are in violation of OSHA and NEC codes since heating and electrical systems are not suitable for the existing hazardous atmospheres and adequate ventilation is not provided. The structures will be demolished and replaced with new block structures.

In Bldg. 575 (Service Building) an adjacent trailer serves as lunch room and spare parts storage area. The trailer is old, cramped and in a deteriorated condition. The spare parts area is inaccessible to large parts storage, as it lacks a double door at ground level. The trailer will be replaced with a masonry addition large enough for a storage area with hoisting equipment and a separate lunch room.

Wastewater Treatment Plant Process Upgrades

This project will complete upgrades of the BNL Sewage Treatment Plant (STP) begun under Sanitary System Upgrade - Phase I (SSU-I), Project 92-E-309. The SSU-I project upgraded the STP from primary treatment capability to secondary treatment by installing a modular aeration tank system and a low lift primary effluent pump station. This project will install an additional modular aeration tank to provide necessary capacity at peak flow conditions. The SSU-II project will also improve the treatment process from secondary to tertiary treatment, and install an ultra-violet disinfection system.

During the construction of the SSU - Phase I project, there was tremendous public, regulatory and political attention focused on the proposed upgrade to the STP and the method of construction. Issues of concern were the environmental impacts of the dewatering discharges required for construction performance of the plant given new, more stringent SPDES permit requirements, and nitrogen levels in the effluent given the recent

1. Title and location of project:	Sanitary System Modifications, Phase II Brookhaven National Laboratory Upton, New York	2a. Project No. 95-E-308 2b. Construction Funded

8. Project Description, Justification and Scope (Continued)

inclusion of the Peconic River under the Peconic Bay National Estuary Program. Due to these concerns, the SSU-I project was put on hold to evaluate alternate methods of construction and the feasibility of installing enhanced treatment methods now, rather than as planned in the SSU-III project slated for funding in FY 1999.

This project will enable all the near-term STP improvements to be completed under one contract. This approach is more cost effective, will assure compliance of the STP and addresses the concerns of the regulators and public. This revised project will complete the original scope of the SSU-I and SSU-II projects (except for a portion of pipe replacements) and provide the additional treatment capability needed at the STP due to changing SPDES and environmental requirements.

9. Details of Cost Estimate a/

	Item Cost	Total Cost
a. Design and management costs		$ 569
1. Engineering, design, and inspection at approximately 16% of construction costs, item b	$ 494	
2. Project management at 2 percent of construction costs	75	
b. Construction costs 3,127		
1. Pipe Replacement Contract No. 1	401	
2. Pipe Replacement Contract No. 2	525	
3. WWTF Building Improvements	386	
4. WWTF Modular Aeration Tank b/	1,268	
5. UV Disinfection System b/	290	
6. Tertiary Treatment Upgrade b/	257	
Subtotal	$3,696	

a/ Estimate is based on a Conceptual Design Report dated March 1992 and Title I Report dated 6/95.

b/ The net difference of this additional scope less the reduced piping scope accounts for $552,000 increase from the previous estimate when engineering, contingency and associated indirect costs are combined.

1. Title and location of project:	Sanitary System Modifications, Phase II Brookhaven National Laboratory Upton, New York	2a. Project No. 95-E-308 2b. Construction Funded

9. Details of Cost Estimate a/ (Continued)	Item Cost	Total Cost
c. Contingency at approximately 15% of above costs	554	
Total line item costs	$4,250	c/

10. Method of Performance

Design will be accomplished under a negotiated architect-engineering contract and project management, quality assurance and inspection will be accomplished by Design and Construction Division of Plant Engineering. Construction and procurement will be accomplished by three or more competitively obtained lump sum contracts.

11. Schedule of Project Funding and Other Related Funding Requirements

Not required on projects with a TEC of less than $5,000,000 per draft DOE Order 5100.3a.

12. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Conceptual design completed at $50,000. Other data not required on projects with a TEC of less than $5,000,000 per draft DOE Order 5100.3a.

13. Incorporation of Fallout Shelters in Future Federal Buildings

Not applicable.

c/ Includes $405,000 of Brookhaven National Laboratory's indirect costs in accordance with Cost Accounting Standards. This includes $166,000 increase from the previous estimate due to revised FY 1995 DOE guidance on calculation of indirect costs.

Note: Escalation rates used were taken from DOE Departmental Price Change Index - FY 1993 Guidance, August 1991 update.

DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST

(Tabular dollars in thousands. Narrative material in whole dollars.)

Multiprogram Energy Laboratories - Facilities Support
Multiprogram Energy Laboratories - Environment, Safety and Health Support

1. Title and Location of Project: Fire Safety Improvements - Phase III
Argonne National Laboratory - East
Argonne, Illinois

2a. Project No. 95-E-307
2b. Construction Funded

3a. Date A-E Work Initiated, (Title I Design Start Schedule): 2nd Qtr. FY 1995

3b. A-E Work (Title I & II) Duration: 10 Months

5. Previous Cost Estimate:
Total Estimated Cost (TEC) -- $3,003
Total Project Cost (TPC) -- $3,069

4a. Date Physical Construction Starts: 2nd Qtr. FY 1996

4b. Date Construction Ends: 4th Qtr. FY 1998

6. Current Cost Estimate:
TEC -- $3,003
TPC -- $3,069

7. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1995	$ 210	$ 210	$ 137
1996	1,075	1,075	387
1997	1,000	1,000	1,200
1998	718	718	765
1999	0	0	514

1. Title and Location of Project:	Fire Safety Improvements - Phase III Argonne National Laboratory Argonne, Illinois	2a. Project No. 95-E-307 2b. Construction Funded

8. Project Description, Justification and Scope

a. General

This project encompasses the third phase of site wide fire safety modifications at Argonne National Laboratory - East (ANL-E).

This project provides new exit routes and upgrade existing exit routes in various facilities. Typical improvements will vary with each facility and will include the following:

1. Widen existing corridors
2. Provide required stairwell and corridor fire ratings
3. Upgrade fire rating of doors
4. Provide new corridors and aisles
5. Provide new building exits
6. Replace obsolete fire alarm system components and add to fire sprinkler protection.

Preliminary building surveys are in progress to ascertain specific building component deficiencies. These surveys are directed in two areas of review: 1) means of egress; and 2) fire separation/fire protection of building elements. This phase, Phase III, will address building means of egress life safety deficiencies (i.e., those building exit components not in compliance with the NFPA 101 "Life Safety Code").

b. Means of Egress

ANL has completed the 1991 multiple building surveys of "means of egress" deficiencies. The deficiencies, in general, cover lack of required exit routes for building occupants.

1. Title and Location of Project:	Fire Safety Improvements - Phase III Argonne National Laboratory Argonne, Illinois.	2a. Project No. 95-E-307 2b. Construction Funded

8. Project Description, Justification and Scope (Continued)

The ANL Fire Safety Improvements project is a multi-year multiple phase project being implemented to correct building fire protection and life safety deficiencies. The first two phases will address Factory Mutual survey recommendations, replace obsolete fire alarm system components and provide fire sprinkler protection to areas presently unprotected.

a. This project is proposed as part of ANL's 1991 Action Plan #AP165, which was developed in response to DOE Tiger Team findings. Finding #FP.2-1 "Life Safety Code NFPA 101" and #WS.4-6 "Non-Compliance-Means of Egress" identified that ANL's building exit routes were not in compliance with 29 CFR 1910.36(b)(6), and NFPA 101.

b. This project is required to comply with the following DOE Orders and national codes.

DOE Order 5480.7 "Fire Protection"
Section 5480.7 (10)(b)(5) - requiring limitations of fire spread with appropriate fire barriers.
Section 5480.7 (10)(b)(7) - requiring adequate fire resistive construction of enclosures such as stairwells.

DOE Order 5480.4 "Environmental Protection, Safety and Health Protection Standards" Appendix 2 - listing NFPA Fire Codes as mandatory standards.

Alternatives to the Proposed Actions

There appear to be two alternatives to Phase III of the Fire Safety Improvements Projects. These are: (1) take no action; and (2) make only minimal repairs and renovate only progressively when absolutely necessary.

No Action, Alternative No. 1

This alternative would allow existing fire and life safety deficiencies to continue in their present condition. The existing buildings covered in this report are not in compliance with the Life Safety Code, NFPA 101, which is a mandatory DOE code. If no action is taken, employees working within these buildings would be subject to high risk of injury or death resulting from fire. This action would be in violation of ANL's Tiger Team Assessment Plan items as approved by DOE. This action is not recommended.

1. Title and Location of Project:	Fire Safety Improvements - Phase III Argonne National Laboratory Argonne, Illinois	2a. Project No. 95-E-307 2b. Construction Funded

8. Project Description, Justification and Scope (Continued)

Alternative No. 2

This alternative is more expensive over a long period and allows existing fire and life safety violations to continue until renovation occurs. This piecemeal rectification approach over a long period of time increases the number of times that buildings and research projects must be disturbed for renovation. This action would be in violation of ANL's Tiger Team Assessment Action Plan as approved by DOE. This action is not recommended.

Recommendation

The renovation work as described herein is the recommended approach to expediently correct the fire and life safety deficiencies in the existing buildings.

9. Details of Cost Estimate

	Item Cost	Total Cost
a. Design and management costs		$ 501
1. Engineering design and inspection at approximately 17.6 percent of construction costs	$ 370	
2. Construction management at approximately 4 percent of construction costs	80	
3. Project management costs at approximately 3 percent of construction costs	51	
b. Construction costs		2,108
Subtotal		2,609
c. Contingencies at approximately 15 percent of above costs		394
Total line item cost		$ 3,003 a/ b/

a/ Estimates are based on a completed conceptual design and current cost data.

b/ All costs have been escalated from January 1992 to the midpoint of construction at the rate of 17.7%. Escalation rate methodology is based upon DOE FY 1995 Guidance dated August 1993: FY 1992 - 2.5%, FY 1993 - 2.4%, FY 1994 - 3.3%, FY 1995 - 3.6%, FY 1996 - 3.6%, and FY 1997 - $3.7%.

1. Title and Location of Project:	Fire Safety Improvements - Phase III Argonne National Laboratory Argonne, Illinois	2a. Project No. 95-E-307 2b. Construction Funded

10. Method of Performance

Engineering and design will be performed under a negotiated A/E contract with guidance, review and monitoring by laboratory personnel. Inspection will be performed by laboratory personnel aided by the A/E firm. Construction management and project management will be performed by laboratory personnel. Construction will be accomplished by fixed-price lump sum contract(s) awarded on the basis of competitive bidding.

11. Schedule of Project Funding and Other Related Funding Requirements

Not required on projects with a TEC of less than $5,000,000.

12. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

Conceptual design completed at a cost of $66,000. No other data required on projects with a TEC of less than $5,000,000.

13. Incorporation of Fallout Shelters in Future Federal Buildings

No new buildings are planned under this project.

DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST

(Tabular dollars in thousands. Narrative material in whole dollars.)

Multiprogram Energy Laboratories - Facilities Support
Multiprogram Energy Laboratories - General Purpose Facilities

1. Title and Location of Project:	Central Heating Plant Rehabilitation - Phase I Argonne National Laboratory Argonne, Illinois	2a. Project No. 95-E-301 2b. Construction Funded
3a. Date A-E Work Initiated, (Title I Design Start Scheduled): 2nd Qtr. FY 1995 3b. A-E Work (Title I & II) Duration: 11 Months		5. Previous Cost Estimate: Total Estimated Cost -- $9,880 Total Project Cost --- $10,055
4a. Date Physical Construction Starts: 3rd Qtr. FY 1996 4b. Date construction ends: 2nd Qtr. FY 1999		6. Current Cost Estimate: TEC -- $9,880 TPC -- $10,055

7. Financial Schedule:

Fiscal Year	Appropriation	Obligations	Costs
1995	$ 1,307	$ 1,307	$ 443
1996	2,631	2,631	2,870
1997	2,500	2,500	2,400
1998	3,442	3,442	2,152
1999	0	0	2,015

1. Title and Location of Project:	Central Heating Plant Rehabilitation - Phase I Argonne National Laboratory Argonne, Illinois	2a. Project No. 95-E-301 2b. Construction Funded

8. Project Description, Justification and Scope

This project will provide the most urgently needed rehabilitation/upgrade of the central heating plant (CHP) systems and components that are no longer adequate, efficient or reliable, including (as needed): boilers (tubing, drums, refractory, baffles, casing, insulation); boiler auxiliaries (fans, pumps, drives, soot blowers); deaerators; condensate tanks; material transport (coal, bottom ash, flyash, spent sorbent); piping (steam, condensate, feedwater, blowdown, cooling water); valves (isolation, blowdown, safety, non-return); pollution control equipment (dust collectors, baghouse); instrumentation and control (controllers, transmitters, transducers, recorders, uninterruptible power supply) electrical (switchgear, starters, PA systems, instrumentation, lighting); building envelope and interior (windows, doors, gratings and floor plates, column fireproofing, painting); plumbing (water and drain piping). The project will also include: a 1,500 square foot brick and block cavity wall addition containing a first floor clean assembly and repair area and a space below grade that will be waterproofed to form a 12,000 cubic foot concrete tank for storage of boiler make-up water; two external stair towers; and a new control room.

The CHP is a 58,918 square foot steel frame structure that contains 5 water tube boilers, with combined rated steam capacity of 510,000 pounds per hour and has a replacement value of $45,266,000. The facility provides steam, sitewide, for: heating of buildings; heating of water; absorption air conditioning cycles; turbine drives on emergency electric generators; concentration of radioactive wastewater; food preparation and serving; and research requirements.

A number of studies and assessments have identified existing conditions at the CHP that do not meet current health, safety and environmental protection standards, codes and guidelines or that diminish the reliability of the site steam supply system, a system that is vital for maintaining building and programmatic functions at the laboratory. These conditions are discussed in some detail below.

Tiger Team concern MA.5-1 states that "the Argonne National Laboratory-East inspection and corrective action program is not effective in assuring the design operability of facility support systems." Given present conditions, implementation of a maintenance program to accomplish this goal is no longer a viable option for CHP, as follows:

1. Title and Location of Project: Central Heating Plant Rehabilitation - Phase I Argonne National Laboratory Argonne, Illinois	2a. Project No. 95-E-301 2b. Construction Funded

8. Project Description, Justification and Scope (Continued)

Nearly all equipment in the Central Heating Plant is between 27 and 42 years of age. Adequate maintenance is difficult and very costly because replacement parts for many of the components are no longer available and because there is no dedicated clean area where repairs can be made efficiently and without delay. The condensate tank has no back-up and there is no tank for storage of the make-up water needed during temporary outage of the water treatment plant or in the event of condensate return system contamination or piping failure. The baghouse booster fan enclosure is uninsulated, which causes condensation and corrosion. Boiler pumps and fans and their turbine drives are operating at reduced capacity and are unreliable. Valves do not seat. Boiler No. 5 blowdown piping and some condensate piping is badly eroded and weakened. Operating efficiencies are reduced and fuel costs excessive. There is no secondary containment for oil storage, which is an NFPA-30 requirement. Safe, efficient and reliable plant operation is increasingly difficult to achieve.

Tiger Team Concern FP.2-1 states that "Argonne National Laboratory-East is not in compliance with Life Safety Code, NFPA-101." Recently completed studies have confirmed that the building's emergency egress and emergency public address systems are inadequate.

Tiger Team Finding No. A/CF-7 cites numerous pollutant excursions exceeding NEPA limits. These have occurred because of the currently degraded and unreliable operating condition of the existing flue gas control system.

Based on the building's size, height and occupancy, the applicable codes (Chapter 28 - NFPA 101, Section 3.6 of Appendix B - NFPA 45, Article 3 - BOCA) require that the currently unprotected structural support columns be fireproofed to provide a two-hour rating.

Failure to implement this urgently needed rehabilitation may seriously impact all other operations of this research and development facility, including all ongoing research. Without this rehabilitation work, safety standards for plant and personnel will deteriorate, operating costs and maintenance costs will increase, and the environment will be adversely affected.

1. Title and Location of Project: Central Heating Plant Rehabilitation - Phase I Argonne National Laboratory Argonne, Illinois	2a. Project No. 95-E-301 2b. Construction Funded

8. Project Description, Justification and Scope (Continued)

Alternatives to the Proposed Action

There appear to be three alternatives other than the proposed rehabilitation project: (1) take no action; (2) make only minimal repairs and rehabilitate only progressively when and as necessary; and (3) provide a totally new replacement project.

No Action, Alternative 1

This approach would allow the adverse environmental, fire, safety and health conditions and the inefficient mechanical and electrical systems to continue in their present state. The frequency and duration of partial or total functional shutdowns and negative impact on productivity of scientific work, some of which is time-sensitive, would increase. Yearly maintenance costs would also increase and be subject to inflationary pressures as well. The building would continue to be in violation of life safety and fire protection codes and the potential for structure and equipment failure that could compromise the health and safety of the operational staff would continue to increase. Finally, personnel morale would be impaired. This approach is not recommended.

Minimal and Progressive Rehabilitation, Alternative 2

This is the option now employed. It is an expensive approach over a long period of time and allows various adverse environmental, fire protection, safety, and health conditions, inefficient physical plant systems and periodic scientific shutdowns to continue until renovation occurs sometime in the future. The repairs are expensive and represent a bandaid approach as some working mechanical and electrical parts are no longer available for the existing systems and equipment. The unreliability of aged and worn components compounds the problems. Importantly, the piecemeal rectification approach over a long period of time increases the number of times that equipment must be shut down for rehabilitation. Due to the adverse ES&H and fiscal impacts, this approach is not recommended.

1. Title and Location of Project: Central Heating Plant Rehabilitation - Phase I, Argonne National Laboratory, Argonne, Illinois

2a. Project No. 95-E-301

2b. Construction Funded

8. Project Description, Justification and Scope (Continued)

Total New Replacement Project, Alternative 3

This approach would involve construction of a new CHP building on a different site at Argonne which would contain approximately 58,918 gross square feet to provide the same functions as the existing facility. The estimated cost at the completion of the project would be $45,266,000. This approach is not recommended.

Recommendation

The rehabilitation work and the new building additions as described in this report is the recommended approach to expediently resolve the described problems.

9. Details of Cost Estimate a/

	Item Cost	Total Cost
a. Design and management costs		$1,354
1. Engineering design and inspection at approximately 14 percent of construction costs	1,030	
2. Project management at approximately 2.8 percent of construction costs	206	
3. Construction management at approximately 1.6 percent of construction costs	118	
b. Construction Costs		7,238
Subtotal		8,592
c. Contingencies at approximately 15 percent of above costs		1,288
Total line item cost		$ 9,880 a/b/

a/ Estimates are based on a completed conceptual design and current cost data.

b/ Laboratory overhead costs have been applied based on cost element type at the rate of 6.2% for materials and sub-contracts, i.e., 7% for service centers, 20.2% for common support (19.2% for FY 1996 and outyears) and 1.9% for general and administrative expenses (applied to all cost elements).

Note: All costs have been escalated from January 1994 to the midpoint of construction at the rate of 18.6%. Escalation rate methodology is based upon DOE FY 1995 Guidance, dated August 1993: FY 1992 - 2.5%; FY 1993 - 2.4%; FY 1994 - 3.3%; FY 1995 - 3.6%; FY 1996 - 3.7%; and FY 1997 - 3.7%..

1. Title and Location of Project: Central Heating Plant Rehabilitation - Phase I
Argonne National Laboratory
Argonne, Illinois

2a. Project No. 95-E-301
2b. Construction Funded

10. Method of Performance

Engineering and design will be performed under a negotiated A/E contract with guidance, review and monitoring by laboratory personnel. Inspection will be performed by laboratory personnel aided by the A/E firm. Construction management and project management will be performed by laboratory personnel. Construction will be accomplished by fixed-price lump sum contract(s) awarded on the basis of competitive bidding.

11. Schedule of Project Funding and Other Related Funding Requirements

	Previous Years	FY 1996	FY 1997	FY 1998	FY 1999	Total
a. Total project funding						
1. Total facility costs						
(a) Line item	$ 443	$ 2,620	$ 2,730	$ 3,110	$ 977	$ 9,880
Total direct cost	443	2,620	2,730	3,110	977	9,880
2. Other project costs						
(a) Conceptual design costs .	170	0	0	0	0	170
(c) Documentation costs . . .	5	0	0	0	0	5
Total other project costs	175	0	0	0	0	175
Total project costs (TPC) . . .	$ 618	$ 2,620	$ 2,730	$ 3,110	$ 977	$10,055

b. Related annual costs (estimated life of project: 25 years)
None.

12. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
1. Total facility costs
(a) Line item -- Narrative not required.

12. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (Continued)

2. Other project costs
   (a) Conceptual design costs are for Conceptual Design Reports.
   (b) Documentation costs include preparation of project data sheets, design criteria/reviews, and Environmental Evaluation Notification Form (DOE-CH 560).

b. Related annual funding
None.

13. Incorporation of Fallout Shelters in Future Federal Buildings

Not applicable.

(Tabular dollars in thousands. Narrative material in whole dollars.)

Multiprogram Energy Laboratories - Facilities Support
Multiprogram Energy Laboratories - General Purpose Facilities

1. Title and Location of Project: Roofing Improvements
Oak Ridge National Laboratory
Oak Ridge, Tennessee

2a. Project No. 94-E-363
2b. Construction Funded

3a. Date A-E Work Initiated, (Title I Design Start Scheduled): 1st Qtr. FY 1994

3b. A-E Work (Title I & II) Duration: 12 Months

5. Previous cost estimate:
Total Estimated Cost (TEC) -- $16,000
Total Project Cost (TPC) -- $16,132

4a. Date Physical Construction Starts: 2nd Qtr. FY 1994

4b. Date Construction Ends: 2nd Qtr. FY 2001

6. Current Cost Estimate:
TEC -- $16,000
TPC -- $16,132

7. Financial Schedule:

Fiscal Year	Appropriation	Adjustments	Obligations	Costs
1993	$ 4,024	$-4,024 a/	$ 0	$ 0
1994	3,300	- 164 b/	3,136	75
1995	3,000	-2,803 c/	197	2,463
1996	2,089	0	2,089	1,431
1997	0	0	0	600
1998	10,578	0	4,000	3,000
1999	0	0	6,578	4,200
2000	0	0	0	3,462
2001	0	0	0	769

a/ This project was proposed as an FY 1993 new start (93-E-329). Application of a portion (-$4,024,000) of the FY 1993 programmatic general reduction of $40,000,000 necessitated a delay in the start of this project to FY 1994.
b/ Reflects reductions as follows: $-68,000 Contractor Salary Freeze; $-96,000 rescission.
c/ Reflects application of a portion ($-2,803,000) of Energy Supply Research and Development reductions.

1.	Title and Location of Project:	Roofing Improvements Oak Ridge National Laboratory Oak Ridge, Tennessee	2a. 2b.	Project No. 94-E-363 Construction Funded

8. Project Description, Justification and Scope

This project will replace deteriorated roofing on buildings and facilities throughout the Oak Ridge National Laboratory complex. ORNL has over 2.4 million square feet of roof area on approximately 160 buildings. Based on a recent study by the laboratory's Plant and Equipment Division, approximately seventy percent of the total area needs to be replaced due to age and deterioration. This project is the first of several planned projects to replace the deteriorated roofing. It will replace the roofs that are in the worst condition (top priority) on buildings housing the most important facilities. Most of the existing roofing materials contain asbestos and much of it has traces of radioactive contaminants. This project will provide for the installation of new roofing and includes the necessary engineered controls to assure compliance with applicable health and safety regulations.

Approximately 70 percent of the roofs have been in service for over 20 years. Because of age and deterioration, many of these roofs have already developed leaks and require an increasing amount of maintenance. The results of the Plant and Equipment Division study of these roofs, giving the type and condition of each roof by building, including conditions of asbestos and/or radioactive contamination, were used as the basis of the conceptual design. In some cases the problems have reached the point that they could affect equipment, records, and research activities, as well as the health and safety of personnel working in the buildings or facilities.

During the past few years budget constraints and the increased cost of satisfying environment, safety and health regulations have resulted in a reduction in funds available for roof replacement. The effects of this shortfall have been compounded by the increased cost associated with restrictions placed on work with or around asbestos materials. Most of the roofs needing replacement involve asbestos materials. This combination of factors has resulted in a growing backlog of roofs that need replacement due to a lack of adequate funding. The current average annual cost of roof repairs is $800,000. This does not include damage from leaks before repairs are made. There is currently a backlog of over $5 million of repairs needed. The roof replacement program is normally funded from expense funds; however, line item funding is requested because of the magnitude of the backlog and the need to provide an acceptable margin of response to meeting future replacement needs in a timely manner.

Failure to fund this project will result in a continuation of the expensive piece-meal repair program. As the roofs age, the number of leaks will increase, repairs will become more expensive and the potential for serious structural and equipment damage will grow, along with the threat to employee health and safety. Further deterioration of facilities could result in decreased program funding for DOE and ORNL.

1.	Title and Location of Project:	Roofing Improvements Oak Ridge National Laboratory Oak Ridge, Tennessee	2a. 2b.	Project No. 94-E-363 Construction Funded

8. Project Description, Justification and Scope

Use of the metric system of measurement for design, procurement and construction of this project was considered; but because of the nature of the work and the prevailing practices in the region, it was determined to be uneconomical.

9. Details of Cost Estimate a/

	Item Cost	Total Costs
a. Design and management costs		$ 2,300
1. Engineering design and inspection at approximately 7 percent of items b and c	$ 800	
2. Construction management at approximately 12 percent of items b and c	1,300	
3. Project management costs approximately 2 percent of items b and c	200	
b. Construction costs (install new roofing) b/		2,860
c. Removal and packaging of existing roofing		8,040
d. Design and project liaison, testing, checkout and acceptance		200
Subtotal		13,400
e. Contingencies at approximately 19 percent of above costs		2,600
Total line item cost		$16,000

10. Method of Performance

Design shall be performed under a negotiated architect-engineer contract and inspection shall be performed by the operating contractor. To the extent feasible, construction and procurement shall be accomplished by fixed-price contracts and subcontracts awarded on the basis of competitive bidding.

a/ The cost estimate is based on conceptual design completed April 1991 at a cost of $70,000 and updated March 1993. The DOE Headquarters Economic Escalation Indices for Construction Projects were used as appropriate over the project cycle.

b/ Construction costs include $60,000 for readiness reviews.

1. Title and Location of Project:	Roofing Improvements Oak Ridge National Laboratory Oak Ridge, Tennessee	2a. 2b.	Project No. 94-E-363 Construction Funded

11. Schedule of Project Funding and Other Related Funding Requirements

	Previous Years	FY 1996	FY 1997	FY 1998	FY 1999	FY 2000	Total
a. Total project costs							
1. Total facility costs							
(a) Line item	$ 2,538	$ 2,500	$ 300	$ 3,000	$ 4,200	$ 3,462	$16,000
Total direct costs	2,578	2,500	300	3,000	4,200	3,462	16,000
2. Other project costs							
(a) Conceptual design costs	70	0	0	0	0	0	70
(b) Site characterization	7	0	0	0	0	0	7
(c) NEPA documentation	5	0	0	0	0	0	5
(d) Other project related costs	50	0	0	0	0	0	50
Total other project related costs	132	0	0	0	0	0	132
Total project costs (TPC)	$ 2,670	$ 2,500	$ 300	$ 3,000	$ 4,200	$ 3,462	$16,132

b. Related annual funding (estimated life of project: 20 Years) ..... $ 515

12. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

a. Total project funding
   1. Total facility costs
      (a) Line item costs for design, procurement, removal of the old roofing, proper packaging of all project waste, and installation of the new roof are estimated to be $16,000,000. This includes $60,000 for readiness reviews.
   2. Other project costs
      (a) Conceptual design costs - The conceptual design was completed April 1991 at a cost of $70,000.
      (b) Site characterization costs - $7,000.

1. Title and Location of Project:	Roofing Improvements Oak Ridge National Laboratory Oak Ridge, Tennessee	2a. Project No. 94-E-363 2b. Construction Funded

12. Narrative Explanation of Total Project Funding and Other Related Funding Requirements (Continued)

2. Other project costs
   (c) NEPA documentation costs - $5,000.
   (d) Other project related funding - Design criteria completed July 1992 at a cost of $50,000.

b. Related annual funding
   1. Other costs - The estimated average annual cost in FY 1994 dollars to repair the roofing installed by this project over the estimated 20 year life is $515,000.

13. Incorporation of Fallout Shelters in Future Federal Buildings

This project does not include the construction of new buildings or building additions, therefore, the provision for fallout shelters is not applicable.

ENERGY RESEARCH-ENERGY SUPPLY RESEARCH AND DEVELOPMENT PROGRAM DIRECTION

PROGRAM MISSION

This program provides the Federal staffing and associated funding required to provide overall direction of activities carried out under the following programs: Biological and Environmental Research, Basic Energy Sciences, Computational and Technology Research, Multiprogram Energy Laboratories-Facilities Support and Energy Research Analyses. This funding also provides the necessary support to the Director of Energy Research to carry out Energy Research (ER) responsibilities under the Department of Energy (DOE) Organization Act (P.L. 95-91) and as mandated by the Secretary. These responsibilities include providing advice on the status and priorities of the Department's overall research and development programs and on the management of the Department's multipurpose laboratories; developing research and development plans and strategies; and managing the Multiprogram Energy Laboratories-Facilities Support (MEL-FS) program. The program supports staffing resources at the Chicago and Oakland Operations Offices directly involved in executing ER programs.

Program direction has been divided into four categories: salaries and benefits, travel, support services, and other related expenses. Support services refers to program direction funded support services contracts that provide necessary support functions to the Federal staff, such as technical support, computer systems development, travel processing, and mailroom. Other related expenses refers to other administrative costs of maintaining Federal staff, such as building and facility costs and utilities in the field, information technology expenses, training and the Working Capital Fund at Headquarters.

The GOAL of Energy Research-Energy Supply Research and Development Program Direction is to:

Fund the staff and related expenses which are necessary to provide overall management direction of ER's scientific research programs funded in the Energy Supply Research and Development appropriation, except Fusion Energy Sciences, and to enable the Director of ER to serve as the Department's science advisor for formulation and implementation of basic research policy.

PROGRAM MISSION - ENERGY RESEARCH-ENERGY SUPPLY PROGRAM DIRECTION (Cont'd)

The OBJECTIVES related to these goals are:

1. To develop, direct and administer a complex and broadly diversified program of mission-oriented research, including the construction and operation of forefront scientific research facilities for use by the Nation's scientific community.

2. To conduct independent technical assessments, peer reviews and evaluations of specific programs and projects. The staff annually monitors and evaluates approximately 2,500 individual research projects at over 250 separate institutions and provides overall direction of research and development programs designed to support the development of new and improved energy, environmental and health technologies.

PERFORMANCE MEASURES:

1. Responsiveness to national science policy and major science initiatives.

2. Improvement in environment, safety and health compliance.

3. Provision of new and enhanced research facilities and equipment.

4. Continued improvement in the utilization of staffing, travel and support contractor funds.

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS:

- Energy Research continues to achieve technical excellence in its programs despite managing one of the largest, most diversified and most complex basic research portfolios in the Federal Government with a relatively small Federal and support contractor staff compared to similar programs.

- Increased productivity at U.S. scientific research facilities as part of our Scientific Facilities utilization initiative.

- Initiation of research at the newly commissioned Advanced Photon Source in FY 1997; the facility was completed on schedule and within budget.

PROGRAM MISSION - ENERGY RESEARCH-ENERGY SUPPLY PROGRAM DIRECTION (Cont'd)

- Effective use of the Laboratory Operations Board to achieve improvements in the efficiency and productivity of the DOE laboratory system.
- Implementation of the Work Smart Standards Process for establishing standards for environment, safety and health protection. This process tailors environment, safety and health standards to the appropriate risks inherent in particular facilities and operations.
- Completion of Energy Research work at the Environmental Measurements Laboratory and transfer of management responsibility for the Lab from Energy Research to Environmental Management at the beginning of FY 1998.
- Ensuring the science and technology parts of the National Energy Policy Plan are achieved.

ENERGY RESEARCH ENERGY SUPPLY, RESEARCH AND DEVELOPMENT PROGRAM DIRECTION a/
PROGRAM FUNDING PROFILE
(Dollars in thousands)

	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Activity					
Operating Expenses a/	$0	$30,600	$0	$30,600	$30,600
TOTAL, ER-Energy Supply Program Direction	$0 b/	$30,600	$0	$30,600	$30,600
Staffing (FTEs)					
Headquarters FTEs	0	202	0	202	199
Field FTEs	0	42	0	42	3
TOTAL, FTEs	0	244	0	244	202

a/ The operating expenses include Working Capital Fund charges, which are estimated to be $3,250,000 in FY 1997 and $4,200,000 in FY 1998.

b/ The Energy Research-Energy Supply Program Direction decision unit was established in FY 1997 at the direction of Congress, through consolidation of five separate program direction accounts. Comparable FY 1996 funding is included in the budget narrative for each of those accounts.

Public Law Authorization:

Pub. Law 95-91, DOE Organization Act

ENERGY RESEARCH-ENERGY SUPPLY PROGRAM DIRECTION
(Tabular dollars in thousands, narrative in whole dollars)

I. Mission Supporting Goals and Objectives

Program Direction provides the Federal staffing resources and associated costs required to provide overall direction and execution of Office of Energy Research program and advisory responsibilities. Energy Research-Energy Supply Research and Development Program Direction supports staff in the Basic Energy Sciences, Biological and Environmental Research, Computational and Technology Research, Multiprogram Energy Laboratories-Facilities Support and Energy Research Analyses programs, including management and technical support staff. This program also supports staff at the Chicago Operations Office directly involved in program execution. The staff includes scientific and technical personnel as well as program support personnel in the areas of budget and finance, general administration, grants and contracts, information resource management, policy review and coordination, infrastructure management and construction management.

The FY 1998 request includes Working Capital Fund resources of $4,200,000 to cover the costs of centrally provided goods and services at Headquarters, such as supplies, housing, utilities, etc., which previously were budgeted in Departmental Administration.

II. Funding Table:

	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Chicago					
Salary and Benefits	$0	$2,730	$0	$2,730	$385
Travel	0	85	0	85	10
Support Services	0	650	0	650	0
Other Related Expenses	0	560	0	560	5
Total	$0	$4,025	$0	$4,025	$400
Full-Time Equivalents	0	42	0	42	3

II. Funding Table (cont'd):

	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Headquarters					
Salary and Benefits	$0	$18,374	$0	$18,374	$18,960
Travel	0	795	0	795	790
Support Services	0	3,876	0	3,876	4,440
Other Related Expenses	0	3,530	0	3,530	6,010
Total	$0	$26,575	$0	$26,575	$30,200
Full Time Equivalents	0	202	0	202	199
Total Energy Research					
Salary and Benefits	$0	$21,104	$0	$21,104	$19,345
Travel	0	880	0	880	800
Support Services	0	4,526	0	4,526	4,440
Other Related Expenses	0	4,090	0	4,090	6,015
Grand Total	$0	$30,600	$0	$30,600	$30,600
Full-Time Equivalents	0	244	0	244	202

III. Performance Summary:

	FY 1996	FY 1997	FY 1998
Salaries and Benefits:	$ 0	$21,104	$19,345

Eliminated 39 Energy Research FTEs at Chicago in FY 1998 resulting from a) completion of Energy Research work at the Environmental Measurements Laboratory and transfer of overall management responsibility for the Lab to Environmental Management and b) completion of construction activities at the Advanced Photon Source.

III. Performance Summary:

There is also a savings of 3 FTEs in FY 1998 at Headquarters. The continued decrease in Headquarters staffing in this account results from process improvement savings arising from successful implementation of activity based costing/management as part of our streamlining efforts. These staffing economies have been achieved despite stable research program budgets and the heaviest grant and contract workload in the Department. Both in FY 1997 and FY 1998, staff will monitor over 2,500 research projects at more than 250 institutions. More than 2,000 research proposals will be peer reviewed, as will selected ongoing programs, and the results will be used to enhance the quality of the research programs. Implementation of Laboratory Operations Board recommendations will improve performance and management of the National Laboratories. Energy Research has the best ratio of program direction dollars to total program dollars in the Department and one of the best ratios of program dollars managed per FTE. Our reengineering efforts have been successful in eliminating unnecessary and non-value added work from the system. Further reductions in staff or program direction funding would prevent us from covering the broad spectrum of scientific disciplines which comprise these programs, which would eventually compromise their scientific productivity and our ability to respond to the needs of the researchers who rely on these programs for support.

0	880	800

Travel:

Further reductions in travel will be achieved in FY 1998 through better use of computer networking and telecommunications and due to fewer travelers.

0	4,526	4,440

Support Services:

Provide necessary mailroom, travel processing, environment, health and safety support, computer systems development and hardware and software installation, configuration, and maintenance activities. Emphasis in FY 1997 and FY 1998 will be placed on development of an information architecture

FY 1996	FY 1997	FY 1998

III. Performance Summary:

	FY 1996	FY 1997	FY 1998
for Energy Research to establish integrated business management systems, consistent with the provisions of the Information Technology Management Reform Act of 1996. This is essential for us to take work out of the system and to meet workload demands with declining staffing levels. ER is widely acknowledged as being the most efficient and conservative user of support services contracts in the Department.			
Other Related Expenses:	0	4,090	6,015
Acquire hardware and software in FY 1997 and FY 1998 to accomplish corporate systems development and networking upgrades. The FY 1997 and FY 1998 estimates include $3,250,000 and $4,200,000, respectively, to cover Headquarters Working Capital Fund charges.			
Total	$0	$30,600	$30,600

IV. Explanation of Funding Changes from FY 1997 to FY 1998:

Decrease of $1,759,000 in salaries and benefits is due to FTE reductions at Headquarters and Chicago which is partially offset by general pay increases and promotions.	-1,759,000
Decrease of $80,000 in travel is due to fewer travelers because of staffing reductions and increased use of alternatives to travel.	-80,000
Decrease of $86,000 in support services is due to increased needs at Headquarters for information architecture which are more than offset by decreased needs in the field, the latter primarily as a result of completion of work at the Environmental Measurements Laboratory.	-86,000
Increase of $1,925,000 in other related expenses is due to an increase of $950,000 in the Departmental Working Capital Fund charges; a $982,000 increase for computer workstation and network infrastructure technology upgrades which will improve operational efficiencies; and a minor decrease in training.	+1,925,000
Total Funding Change, Energy Supply Program Direction	$0

Support Services	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Technical Support Service				
Feasibility of Design Considerations				
Economic and Environmental Analysis		1,377	1,363	-14
Test and Evaluation Studies				
Subtotal		1,377	1,363	-14
Management Support Services				
Management Studies		214	207	-7
Training and Education		50	48	-2
ADP Support		2,131	2,122	-9
Administrative Support Services		754	700	-54
Subtotal		3,149	3,077	-72
Total Support Services		4,526	4,440	-86
Use of Prior Year Balances				

Other Related Expenses	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/ FY 1997 Change ($000)
Training		67	60	-7
Working Capital Fund		3,250	4,200	+950
Printing and Reproduction				
Rental Space				
Software Procurement/Maintenance Activities/Capital Acquisitions		773	1,755	+982
Other				
Total Obligational Authority		4,090	6,015	+1,925
Use of Prior-Year Balances				
Total Budget Authority		4,090	6,015	+1,925

Department of Energy
FY 1998 Congressional Budget Request
Other Energy Programs

Volume 2
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Department of Energy
FY 1998 Budget Request to Congress
(discretionary dollars in thousands)

	FY 1996 Current Appropriation	FY 1996 Comparable Appropriation	FY 1997 Current Appropriation	FY 1997 Comparable Appropriation	FY 1998 Request
Other Energy Programs					
Technical information management					
Technical information management program	11,960	3,160	3,300	3,300	3,427
Program direction	——	8,800	8,700	8,700	8,560
Total, Technical information management	11,960	11,960	12,000	12,000	11,987
In-house energy management	——	342	——	——	——
Field offices and management	——	101,277	98,400	98,400	100,233
Subtotal, Other Energy Programs	11,960	113,579	110,400	110,400	112,220
Use of prior year balances	-180	-180	-163	-163	——
Total, Other Energy Programs	11,780	113,399	110,237	110,237	112,220

DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST
OFFICE OF SCIENTIFIC AND TECHNICAL INFORMATION
ENERGY SUPPLY RESEARCH AND DEVELOPMENT
(Tabular dollars in thousands, Narrative in whole dollars)

TECHNICAL INFORMATION MANAGEMENT

PROGRAM MISSION

The mission of the Technical Information Management (TIM) program is to direct and coordinate the management and dissemination of scientific and technical information resulting from Department of Energy research and development (R&D) and environmental programs. The program also provides worldwide energy scientific and technical information to the Department of Energy, United States (U.S.) industry, academia, and the public and fulfills interagency and international scientific and technical information commitments in support of Departmental and U.S. obligations.

The Department of Energy makes a multi-billion dollar annual investment in energy- and environment-related R&D activities. The primary and immediate product of this investment is knowledge (or information) - knowledge that will lead to more efficient uses and conservation of our nation's energy resources; more advanced technologies for environmental protection and remediation; cleaner-burning fuels; and better transportation sources. Ultimately, the application of the knowledge created by the Department's R&D contributes to a more competitive economy, a cleaner environment, a more secure national defense - in short, a higher standard of living. At the same time, other industrialized nations are also investing in energy R&D, and the resulting technical information is globally recognized as a valuable commodity that can be exchanged in order to save taxpayer dollars and avoid duplicative research. Without effective and comprehensive technical information management, returns on R&D investments will not be realized, and wasteful duplication of effort will likely result. Requirements for technical information management and dissemination are delineated in the American Technology Preeminence Act; the Paperwork Reduction Act (and implementing guidelines); Department of Energy enabling legislation; and international treaties/agreements with the International Atomic Energy Agency and the International Energy Agency.

The GOAL of the TIM program is:

To add value to America's investment in energy research and development by facilitating the use of scientific and technical information to advance U.S. interests.

PROGRAM MISSION - TECHNICAL INFORMATION MANAGEMENT

Specific GOALS include:

- Lead the Department in the management of scientific and technical information resulting from Departmentally-funded programs; and
- Provide worldwide scientific and technical energy information to the Department, U.S. industry, academia, and the public.

The OBJECTIVES related to these goals are to:

- Add value to, improve the availability and the quality of, and reduce the cost of relevant Departmental scientific and technical information;
- Lead/advance the institutionalization of an electronic, decentralized technical information collection that contributes to the development of a "virtual library;"
- Provide more effective mechanisms for public access to global energy-related information; and
- Capitalize on interagency, domestic, and international opportunities to gain access to non-Departmental scientific and technical energy information for U.S. researchers, national security communities, policymakers, academia, and the public.

PERFORMANCE MEASURES

- Percent of Departmental technical information exchanged electronically;
- Age and timeliness of information acquired and disseminated;
- Reduction in cost for information acquisition and processing;
- Level of partnering and adoption of common standards/practices within the Department and among interagency and international information communities;
- Percent and amount of foreign energy-related information acquired to augment the U.S. collection and promote national competitiveness;
- Amount of information disseminated and number and diversity of customer/market segments reached or "benefitted" by the Department's scientific and technical information collection;
- Percent of special customer projects/services completed on time and within budget; and
- Customer satisfaction with Departmental scientific and technical information products and services.

PROGRAM MISSION - TECHNICAL INFORMATION MANAGEMENT

SIGNIFICANT ACCOMPLISHMENTS AND PROGRAM SHIFTS

While there has been a downward trend in funding and staffing in recent years, the TIM program continues to make progress toward strategic priorities that will allow effective operations at current resource levels. These priorities are described below:

- Electronic Information Exchange

  As technology and common standards advance, it becomes more timely and economical to exchange both bibliographic and full-text information in electronic media. While it will be necessary for the Department to maintain a centralized point of coordination for this electronic infrastructure (for policy, standards, archiving, etc.), Departmental elements will realize savings in information technology, management, and printing and publishing as a result of Department-wide electronic exchange. U.S. industry, academic, and research communities will benefit from more easily accessible and readily available domestic and foreign technical information.

- Archive of Legacy Documents

  The Department's valuable historic collection of scientific and technical information represents billions of dollars of research and development and constitutes much of our nation's energy-related science base. Currently, the vast majority of this legacy collection is in microfiche or paper media rather than in electronic form, which is targeted as the primary means of archival by FY 2000. Interagency standards, cooperation, and agreements are now allowing the use of optical media as an acceptable means of storage. In addition to saving resources, optical media also allows a more user-friendly and cost-effective means of access and retrieval.

- Re-engineered Information Processing and Management

  A significant amount of progress has been made in re-engineering automated systems and streamlining processes necessary for the efficient management and dissemination of technical information. In coordination with the electronic exchange initiative, this re-engineering effort will make foreign and domestic information more quickly available through electronic media while also achieving labor savings.

TECHNICAL INFORMATION MANAGEMENT

PROGRAM FUNDING PROFILE
(dollars in thousands)

Subprogram	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Operating Expenses	$ 2,160	$ 2,300	$ 0	$ 2,300	$ 2,427
Program Direction	8,800	8,700	0	8,700	8,560
Subtotal	$ 10,960	$ 11,000	$ 0	$ 11,000	$ 10,987
Construction	1,000	1,000	0	1,000	1,000
Subtotal, Technical Information Management	$ 11,960	$ 12,000	$ 0	$ 12,000	
Adjustment	-180 a/	-163 a/	0 a/	-163 a/	
Total, Technical Information Management	$ 11,780	$ 11,837	$ 0	$ 11,837	

a/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

Public Law Authorization:

Pub. Law: 95-95, DOE Organization Act; Public Law 102-245, American Technology Pre-Eminence Act; Public Law 104-13, Paperwork Reduction Act

TECHNICAL INFORMATION MANAGEMENT
(Dollars in thousands)

PROGRAM FUNDING BY SITE

Field Offices/Sites	FY 1996 Enacted Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Oak Ridge Operations Office					
Office of Scientific and Technical Information....	$11,960	$12,000	$0	$12,000	$11,987
Subtotal.....	$11,960	$12,000	$0	$12,000	$11,987
Adjustment.....	-180 a/	-163 a/	0	-163 a/	0
TOTAL.....	$11,780	$11,837	$0	$11,837	$11,987

a/ Share of Energy Supply, Research and Development general reduction for use of prior year balances assigned to this program. The total general reduction is applied at the appropriation level.

TECHNICAL INFORMATION MANAGEMENT
OPERATING EXPENSES

I. Mission Supporting Goals and Objectives

The Operating Expenses subprogram provides funds for collecting, protecting, and disseminating appropriate Department of Energy information for the benefit of U.S. educational, industrial, and research communities as well as developing and maintaining systems and technologies to transition from traditional information media to electronic information exchange. Specifically, funding is used to procure software and information technology that will promote distributed, decentralized, electronic processing of research data. Contracts are utilized to develop information systems and to analyze and process domestic and foreign technical information. Resources are also used to develop and maintain classified information processing technology and repository capabilities.

II. Funding Schedule:

Activity	FY 1996	FY 1997	FY 1998	$ Change	% Change
Operating Expenses	$2,160	$2,300	$2,427	$ 127	+ 5.5%
Total, Operating Expenses	$2,160	$2,300	$2,427	$ 127	+ 5.5%

TECHNICAL INFORMATION MANAGEMENT
OPERATING EXPENSES

III. Performance Summary - Accomplishments:

Operating Expenses	FY 1996	FY 1997	FY 1998
• Streamline collection, management, and dissemination of DOE R&D results by transitioning from predominately paper-based environment to electronic information exchange and locator technology. Capital equipment funding is included for computer hardware to support electronic information exchange efforts.	$1,560	$1,700	$1,807
• Enhance U.S. economic competitiveness by acquiring foreign technical information and providing availability to domestic research and industrial communities.	400	350	300
• Protect national security while enabling simplified electronic exchange of and access to classified technical information.	200	250	320
Total, Operating Expenses	$2,160	$2,300	$2,427

TECHNICAL INFORMATION MANAGEMENT
OPERATING EXPENSES

EXPLANATION OF FUNDING CHANGES FROM FY 1997 TO FY 1998:

Operating Expenses

The increase reflects a strategic investment of additional resources in electronic exchange of scientific and technical information. This investment will use labor-saving technology to provide more timely information to Departmental and public communities.	$+107,000
The small reduction in acquisition costs for foreign information reflects efficiencies achieved through common data exchange standards and adoption of electronic media.	$-50,000
The increase in classified information support reflects a continued emphasis on declassification as well as the need to modernize exchange and management of classified/sensitive data.	$+70,000
Total Funding Change, Operating Expenses	$+127,000

TECHNICAL INFORMATION MANAGEMENT

PROGRAM DIRECTION

I. Mission Supporting Goals/Ongoing Responsibilities

This program provides Federal staffing and resources to direct and coordinate the management and dissemination of scientific and technical information resulting from Department of Energy research and development and environmental programs; provide worldwide energy scientific and technical information to the Department of Energy, United States (U.S.) industry, academia, and the public; and fulfill international and interagency scientific and technical information commitments in support of Departmental and U.S. obligations.

Program direction provides overall direction, coordination, and administrative support required to fulfill the responsibilities of the Technical Information Management program. Program direction is divided into the following categories:

Salaries and Benefits provides for Federal staff involved in policy development and coordination; representation in international information exchange agreements; human resource management; and other Federal responsibilities.

Travel provides for program-related travel to conduct and fulfill responsibilities outlined under salaries and benefits.

Support Services provides on-site services in such areas as mail operations, local area network support, and analysis of electronic information exchange.

Other Related Expenses represent maintenance and utilities costs for the Office of Scientific and Technical Information facility and equipment for office automation and work requirements.

TECHNICAL INFORMATION MANAGEMENT
PROGRAM DIRECTION

II. Funding Table:

	FY 1996 Current Appropriation	FY 1997 Original Appropriation	FY 1997 Adjustments	FY 1997 Current Appropriation	FY 1998 Budget Request
Oak Ridge, TN (HQ)					
Salaries and Benefits	$ 7,760	$ 7,340	$ 0	$ 7,340	$ 7,260
Travel	110	110	0	110	110
Support Services	230	280	0	280	230
Other Related Expenses	420	520	0	520	500
Total	$ 8,520	$ 8,250	$ 0	$ 8,250	$ 8,100
Full Time Equivalents	131	123	0	123	121
Washington, D.C. (HQ)					
Salaries and Benefits	$ 260	$ 430	$ 0	$ 430	$ 450
Travel	20	20	0	20	10
Support Services	0	0	0	0	0
Other Related Expenses	0	0	0	0	0
Total	$ 280	$ 450	$ 0	$ 450	$ 460
Full Time Equivalents	3	5	0	5	5
Total, Technical Information Management Program					
Salaries and Benefits	$ 8,020	$ 7,770	$ 0	$ 7,770	$ 7,710
Travel	130	130	0	130	120
Support Services	230	280	0	280	230
Other Related Expenses	420	520	0	520	500
Grand Total	$ 8,800	$ 8,700	$ 0	$ 8,700	$ 8,560
Full Time Equivalents	134	128	0	128	126
Adjustments	0	0	0	0	0
Budget Authority	$ 8,800	$ 8,700	$ 0	$ 8,700	$ 8,560

III. Performance Summary	FY 1996	FY 1997	FY 1998
Salaries and Benefits:	$ 8,020	$ 7,770	$ 7,710

The Technical Information Management program is Federally managed and implemented due to the program's inherent government responsibilities. These responsibilities include: (1) maintaining and coordinating a formal Departmental infrastructure to define and implement policy and standards for scientific and technical information in areas such as public access, electronic information exchange, and information security; (2) representing the United States in two multilateral international information exchange agreements, resulting in the acquisition of 85,000 foreign research summaries per year; and (3) management of proprietary and classified information, including serving as the central repository for the Department's 50-year collection of classified and sensitive information. Through partnering, outsourcing, and use of electronic information management technology, Federal staffing has declined from 362 employees to 128 in the last two decades, with the ultimate goal of 116 by FY 2000. The FY 1998 budget request reflects a 2 FTE reduction; remaining staff will continue focusing on defining and developing a decentralized electronic "virtual library" of scientific and technical information throughout the Department.

Travel:	130	130	120

In FY 1996, travel costs were reduced by 33 percent in support of the Department's streamlining efforts. Continued travel savings will be sustained in FY 1997 and FY 1998 through the use of teleconferencing and reduced staffing levels.

III. Performance Summary (cont'd)	FY 1996	FY 1997	FY 1998
Support Services:	$ 230	$ 280	$ 230
In FY 1996, support services were reduced by 40 percent through streamlining and consolidation of contractor tasks. FY 1997 has a one year increase of $50,000 for short-term technical support provided to the data collection, analysis, and technology evaluation associated with the development of more decentralized electronic management of scientific and technical information. FY 1998 will return to a base level of support services needed primarily for internal and external automatic data processing functions.			
Other Related Expenses:	420	520	500
Expenses reflect facility maintenance costs, including scheduled replacement of parts, equipment, and supplies. Expenses also reflect a transition to Pentium-based computer processors and a Windows NT environment. Reduced maintenance and utility costs will provide a $20,000 savings in FY 1998.			
Total	$8,800	$8,700	$8,560

IV. Explanation of Funding Changes FY 1997 to FY 1998:

In Salaries and Benefits, normal escalation is offset by costs associated with a two FTE reduction, resulting in a net reduction of $60,000.	$-60,000
A savings of $10,000 in travel expenses is related to fewer FTEs and telecommunicating.	-10,000
Support Services are reduced by $50,000 as the analysis/evaluation of electronic information exchange and virtual library technology moves into the implementation phase.	-50,000
Other Related Expenses decline by $20,000 as energy-saving improvements reduce utilities and facility costs.	-20,000
Total Funding Change, Program Direction	$-140,000

TECHNICAL INFORMATION MANAGEMENT
PROGRAM DIRECTION (CONT'D)

Support Services	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/FY 1997 Change ($000)
Technical Support Service				
Analysis and Support of Electronic Information Exchange	$ 120	$ 170	$ 120	(-$50)
Management Support Services				
ADP Support	110	110	110	0
Total Support Services	$ 230	$ 280	$ 230	(-$50)

Other Related Expenses	FY 1996 ($000)	FY 1997 ($000)	FY 1998 ($000)	FY 1998/FY 1997 Change ($000)
Training	$ 15	$ 15	$ 15	$ 0
Facility Management	345	395	375	(-$20)
Software Procurement/Maintenance Activities/Capital Acquisitions	60	110	110	0
Total Budget Authority	$ 420	$ 520	$ 500	(-$20)

TECHNICAL INFORMATION MANAGEMENT
CAPITAL OPERATING EXPENSES AND CONSTRUCTION SUMMARY
(Dollars in thousands)

	FY 1996	FY 1997	FY 1998	$ Change	% Change
Capital Operating Expenses					
Capital Equipment (total).....	$250	$250	$250	$0	0

Construction Project Summary (both Operating and Construction Funded)

Project No.	Project Title	TEC	Previous Appropriated	FY 1996 Appropriated	FY 1997 Request	FY 1998 Congressional Request
95-A-500	Office of Scientific and Technical Information Heating, Ventilation, and Air Conditioning HVAC Retrofits	$4,000	$1,000	$1,000	$1,000	$1,000
Total Technical Information Management		$4,000	$1,000	$1,000	$1,000	$1,000

DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST

(Tabular dollars in thousands. Narrative material in whole dollars.)

TECHNICAL INFORMATION MANAGEMENT

1. Title and location of project:	Heating, Ventilation and Air Condition (HVAC) Retrofits of OSTI Facility, Oak Ridge, Tennessee	2a. Project No.: 95-A-500 2b. Construction Funded
3a. Date A-E work initiated: 1st Quarter FY 1995 3b. A-E Work Duration: 12 months		5. Previous Cost Estimate: $3,800 Date: June 1992
4a. Date physical construction starts:	1st Quarter FY 1995 (Asbestos abatement design and review started in 1st quarter FY 1995. Actual removal began in 2nd Quarter FY 1996. Renovation of HVAC will begin in FY 1997 and will be completed in FY 1998, following engineering design and award of contract. Original timetable for completion has been extended by one year due to funding shortfalls in FY 1996 and FY 1997).	6. Current Cost Estimate: $4,000 Date: September 1993
4b. Date construction ends: 3rd Quarter FY 1998		

7. Financial Schedule:

Fiscal Year	Appropriations	Obligations	Costs
1995	$ 1,000	$ 980	$ 270
1996	1,000	1,020	933
1997	1,000	1,000	1,000
1998	1,000	1,000	1,797

1. Title and location of project:	Heating, Ventilation and Air Condition (HVAC) Retrofits of OSTI Facility, Oak Ridge, Tennessee	2a. Project No.: 95-A-500 2b. Construction Funded

8. Project Description, Justification, and Scope:

This project will update and renovate the HVAC systems of the Office of Scientific and Technical Information (OSTI) facility in Oak Ridge, Tennessee. The facility is a single level facility with 132,000 square feet. Proposed changes to the HVAC system include the following: addition of a new chiller (FY 1997), addition of new chilled water distribution system (FY 1997), upgrade of the existing chiller to use a non-ozone-depleting refrigerant (FY 1997), replacement of air conditioning units which are at the end of their useful life (FY 1997), rework of the air distribution system for several of the air conditioning units (FY 1998), replacement of deteriorated air distribution system insulation (FY 1998), and removal of friable asbestos (FY 1996) and asbestos that is associated with HVAC renovations (FY 1996).

The OSTI facility is approximately 50 years old. It was originally constructed for warehouse purposes, and in the early 1950s it was renovated to include office and production areas and now houses over 220 DOE and DOE contractor employees. In the FY 1990 and FY 1991 timeframe under another construction project, the facility's roof, archival area, electrical system, and security area were upgraded. This project also provided for the replacement of the cooling tower and some asbestos removal.

Due to the age of the facility, many heating, ventilating, and air conditioning (HVAC) systems in the building are over or near the end of their useful life. Due to OSTI's expanded mission, many HVAC systems are overloaded and do not meet the building's operational needs. These antiquated HVAC systems require continual maintenance and pose a threat to the invaluable archived material for which OSTI is responsible and to the uninterrupted operation of the computer room, which is central to OSTI's operations. Finally, asbestos is located in several areas above the ceiling. The presence of asbestos is causing personnel and operational problems which need to be eliminated for personnel safety and for ease in maintenance operations.

The work under this project would contribute significantly toward extending the life of the facility to 20 years, enhancing OSTI's ability to perform its mission, assuring uninterrupted operation of OSTI's production equipment, and improving personnel safety.

1. Title and location of project: Heating, Ventilation and Air Condition (HVAC) Retrofits of OSTI Facility, Oak Ridge, Tennessee

2a. Project No.: 95-A-500

2b. Construction Funded

9. Details of Cost Estimate

	Total Cost
a. Engineering, design, and inspection at approximately 12.5 percent of construction costs, item b	$ 335
b. Construction costs	3,145
c. Contingency at approximately 16 percent of above costs	520
Total project costs	$4,000

10. Method of Performance

Titles I, II and III engineering will be accomplished by a prime A/E contractor. Construction and procurement will be accomplished by the Oak Ridge on-site construction management contractor (MK Ferguson) utilizing fixed price subcontracts selected on the basis of competitive bidding.

11. Schedule of Project Funding and Other Related Funding Requirements:

	Prior Years	FY 1995	FY 1996	FY 1997	FY 1998	Total
a. Total project funding						
(1) Total facility costs						
(a) Construction and line item	0	$ 270	$ 933	$ 1,000	$ 1,797	$ 4,000
(b) PE&D	0	0	0	0	0	0
(c) Expense funded equipment	0	0	0	0	0	0
(d) Inventories	0	0	0	0	0	0
Total facility costs	0	$ 270	$ 933	$ 1,000	$ 1,797	$ 4,000
(2) Other project funding						
(a) R&D necessary to complete construction	0	0	0	0	0	0
(b) Other project related costs	0	0	0	0	0	0
Total project funding	0	$ 270	$ 933	$ 1,000	$ 1,797	$ 4,000

1. Title and location of project:	Heating, Ventilation and Air Condition (HVAC) Retrofits of OSTI Facility, Oak Ridge, Tennessee	2a. Project No.: 95-A-500 2b. Construction Funded

b. Total related funding requirements

(1)	Facility operating costs	$ 0
(2)	Programmatic operating expenses directly related to the facility	0
(3)	Capital equipment not related to construction but related to the programmatic effort in the facility	0
(4)	GPP or other construction related to programmatic effort in the facility	0
(5)	Other costs	0
	Total other related annual costs	$ 0

12. Narrative Explanation of Total Project Funding and Other Related Funding Requirements

(None)

Energy Assets Acquisition

Department of Energy
FY 1998 Budget Request to Congress
(discretionary dollars in thousands)

	FY 1996 Current Appropriation	FY 1996 Comparable Appropriation	FY 1997 Current Appropriation	FY 1997 Comparable Appropriation	FY 1998 Request
Energy Assets Acquisition					
Solar and Renewable Resources Technologies					
Solar Energy					
National renewable energy laboratory	—	1,500	—	2,800	2,200
Nuclear Energy					
Nuclear energy research and development					
Test reactor area landlord	—	1,900	—	1,000	10,850
Uranium programs	—	7,000	—	4,000	22,300
Total, Nuclear Energy	—	8,900	—	5,000	33,150
Energy Research					
Biological and environmental research	—	62,620	—	36,113	—
Basic energy sciences	—	5,186	—	9,000	11,000
Multiprogram energy labs - facility support	—	27,538	—	21,260	40,267
Total, Energy Research	—	95,344	—	66,373	51,267
Environmental Restoration & Waste Mgmt. (Non-Defense)					
Waste management	—	7,297	—	5,864	1,900
Nuclear materials and facilities stabilization	—	4,048	—	6,571	397
Total, Environmental Restoration & Waste Mgmt.	—	11,345	—	12,435	2,297
Total, Energy Asset Acquisition	—	117,089	—	86,608	88,914

DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST
ENERGY ASSETS ACQUISITION

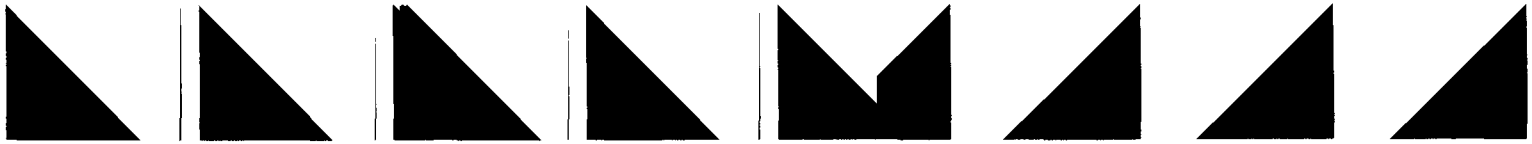
PROPOSED APPROPRIATION LANGUAGE

For expenses of Department of Energy energy supply research and development activities, including the purchase, construction, expansion, and acquisition of plant, real property, and other physical assets to carry out the Department of Energy Organization Act (42 U.S.C. 7101, et seq.), including condemnation of any real property or facility, $88,914,000 to remain available until expended: Provided, That not withstanding section 302 of Public Law 102-377, amounts appropriated under this head shall not be available for transfer to any other appropriation head without further appropriations action by Congress.

DEPARTMENT OF ENERGY
FY 1998 CONGRESSIONAL BUDGET REQUEST
ENERGY ASSETS ACQUISITION

PROJECT DATA SHEETS

The Department's FY 1998 congressional budget request reflects the full funding of new and ongoing fixed asset procurements. Project data sheets under this appropriation are located with the budget justification of the program they support.



Energy Supply Research and Development

Solar and Renewable Resources Technologies

Nuclear Energy

Environment, Safety and Health

Energy Research

Other Energy Programs

Environmental Management

Energy Assets Acquisition