Science
Office of Science
Funding by Site by Program

(dollars in thousands)

	FY 2005	FY 2006	FY 2007
Ames Laboratory			
Basic Energy Sciences	23,538	20,410	20,857
Advanced Scientific Computing Research	1,681	1,450	562
Biological and Environmental Research	800	——	——
Science Laboratories Infrastructure	210	150	——
Workforce Development for Teachers and Scientists	65	65	227
Safeguards and Security	505	507	570
Total, Ames Laboratory	26,799	22,582	22,216
Ames Site Office			
Science Program Direction	470	453	520
Argonne National Laboratory			
Basic Energy Sciences	180,613	171,629	190,810
Advanced Scientific Computing Research	13,145	9,918	28,174
Biological and Environmental Research	26,291	27,297	27,713
High Energy Physics	10,829	8,939	9,748
Nuclear Physics	23,158	18,762	23,682
Fusion Energy Sciences	971	990	960
Science Laboratories Infrastructure	2,457	1,246	3,697
Workforce Development for Teachers and Scientists	1,833	298	2,056
Safeguards and Security	8,671	8,570	8,462
Total, Argonne National Laboratory	267,968	247,649	295,302
Argonne Site Office			
Science Program Direction	3,413	3,677	3,813
Berkeley Site Office			
Science Program Direction	3,361	3,675	4,241

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Brookhaven National Laboratory			
Basic Energy Sciences	89,876	101,633	133,783
Advanced Scientific Computing Research	1,000	673	——
Biological and Environmental Research	23,620	20,172	18,074
High Energy Physics	30,648	26,542	30,193
Nuclear Physics	158,441	146,832	183,255
Science Laboratories Infrastructure	7,706	4,996	5,100
Workforce Development for Teachers and Scientists	734	436	1,013
Safeguards and Security	11,335	11,229	10,967
Total, Brookhaven National Laboratory	323,360	312,513	382,385
Brookhaven Site Office			
Science Program Direction	3,267	3,537	3,643
Chicago Office			
Basic Energy Sciences	180,295	130,276	130,351
Advanced Scientific Computing Research	41,556	24,853	18,164
Biological and Environmental Research	220,252	109,654	75,868
High Energy Physics	127,944	117,772	120,152
Nuclear Physics	73,339	59,258	61,664
Fusion Energy Sciences	135,356	134,241	129,817
Science Laboratories Infrastructure	1,848	——	1,520
Science Program Direction	25,306	24,719	26,162
Workforce Development for Teachers and Scientists	36	——	——
Safeguards and Security	185	825	3,400
SBIR/STTR	113,621	——	——
Total, Chicago Office	919,738	601,598	567,098
Fermi National Accelerator Laboratory			
Advanced Scientific Computing Research	646	1,215	——
High Energy Physics	318,316	298,533	320,367
Nuclear Physics	33	——	——
Fusion Energy Sciences	——	3	——
Science Laboratories Infrastructure	662	491	——
Workforce Development for Teachers and Scientists	62	50	308
Safeguards and Security	3,015	2,893	3,221
Total, Fermi National Accelerator Laboratory	322,734	303,185	323,896

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Fermi Site Office			
Science Program Direction	2,185	2,235	2,346
Golden Field Office			
Basic Energy Sciences	——	4	4
Advanced Scientific Computing Research	——	3	——
Biological and Environmental Research	——	3	——
High Energy Physics	——	4	——
Nuclear Physics	——	3	——
Workforce Development for Teachers and Scientists	622	250	835
Total, Golden Field Office	622	267	839
Idaho National Laboratory			
Basic Energy Sciences	353	225	225
Biological and Environmental Research	3,670	1,566	1,190
Fusion Energy Sciences	2,499	2,380	2,334
Workforce Development for Teachers and Scientists	75	70	340
Total, Idaho National Laboratory	6,597	4,241	4,089
Idaho Operations Office			
Biological and Environmental Research	1,113	——	——
Lawrence Berkeley National Laboratory			
Basic Energy Sciences	135,564	110,437	125,497
Advanced Scientific Computing Research	71,546	65,408	77,559
Biological and Environmental Research	71,818	71,517	72,671
High Energy Physics	43,101	40,834	44,812
Nuclear Physics	18,784	18,399	20,706
Fusion Energy Sciences	6,048	5,653	4,911
Science Laboratories Infrastructure	8,199	15,009	21,500
Workforce Development for Teachers and Scientists	799	379	885
Safeguards and Security	5,733	4,723	4,981
Total, Lawrence Berkeley National Laboratory	361,592	332,359	373,522

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Lawrence Livermore National Laboratory			
Basic Energy Sciences	3,405	2,819	2,854
Advanced Scientific Computing Research	6,734	4,743	1,800
Biological and Environmental Research	26,149	24,224	25,209
High Energy Physics	2,140	1,951	2,196
Nuclear Physics	1,084	643	905
Fusion Energy Sciences	13,751	13,282	12,025
Science Laboratories Infrastructure	150	150	——
Workforce Development for Teachers and Scientists	50	——	78
Total, Lawrence Livermore National Laboratory	53,463	47,812	45,067
Los Alamos National Laboratory			
Basic Energy Sciences	27,624	22,753	21,993
Advanced Scientific Computing Research	3,879	2,832	2,075
Biological and Environmental Research	20,825	17,675	15,479
High Energy Physics	809	540	590
Nuclear Physics	9,647	8,008	10,515
Fusion Energy Sciences	3,831	3,946	3,356
Workforce Development for Teachers and Scientists	50	50	361
Total, Los Alamos National Laboratory	66,665	55,804	54,369
National Energy Technology Laboratory			
Basic Energy Sciences	82	100	——
Biological and Environmental Research	31	——	——
High Energy Physics	81	——	——
Nuclear Physics	16	100	——
Fusion Energy Sciences	81	3	——
Science Laboratories Infrastructure	——	275	——
Workforce Development for Teachers and Scientists	127	263	500
Total, National Energy Technology Laboratory	418	741	500
National Renewable Energy Laboratory			
Basic Energy Sciences	8,043	7,197	7,403
Advanced Scientific Computing Research	150	150	150
Biological and Environmental Research	400	569	875
Workforce Development for Teachers and Scientists	52	——	——
Total, National Renewable Energy Laboratory	8,645	7,916	8,428
NNSA Service Center/Albuquerque			
Biological and Environmental Research	850	800	——

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Oak Ridge Institute for Science and Education			
Basic Energy Sciences	3,455	810	810
Advanced Scientific Computing Research	315	600	——
Biological and Environmental Research	5,557	4,088	4,159
High Energy Physics	278	50	——
Nuclear Physics	1,067	590	703
Fusion Energy Sciences	1,186	1,215	788
Science Laboratories Infrastructure	565	768	——
Science Program Direction	39	——	——
Workforce Development for Teachers and Scientists	1,470	853	1,545
Safeguards and Security	1,403	1,359	1,489
Total, Oak Ridge Institute for Science and Education	15,335	10,333	9,494
Oak Ridge National Laboratory			
Basic Energy Sciences	263,802	276,351	322,480
Advanced Scientific Computing Research	68,786	61,098	82,822
Biological and Environmental Research	45,408	39,746	36,266
High Energy Physics	836	180	182
Nuclear Physics	20,941	19,668	23,349
Fusion Energy Sciences	22,340	20,560	18,650
Science Laboratories Infrastructure	2,188	1,283	8,047
Safeguards and Security	11,891	9,461	8,396
Total, Oak Ridge National Laboratory	436,192	428,347	500,192
Oak Ridge Office			
Basic Energy Sciences	106	80	80
Advanced Scientific Computing Research	200	80	——
Biological and Environmental Research	694	677	373
High Energy Physics	108	16	80
Nuclear Physics	106	80	——
Fusion Energy Sciences	106	80	——
Science Laboratories Infrastructure	5,039	5,028	5,079
Science Program Direction	42,422	42,534	44,252
Workforce Development for Teachers and Scientists	90	90	90
Safeguards and Security	12,862	16,107	17,975
Total, Oak Ridge Office	61,733	64,772	67,929

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Pacific Northwest National Laboratory			
Basic Energy Sciences	15,149	14,763	15,182
Advanced Scientific Computing Research	3,408	6,690	350
Biological and Environmental Research	86,647	80,203	85,695
Fusion Energy Sciences	1,330	1,285	815
Science Laboratories Infrastructure	4,960	4,950	——
Workforce Development for Teachers and Scientists	917	514	1,035
Safeguards and Security	11,133	10,044	10,993
Total, Pacific Northwest National Laboratory	123,544	118,449	114,070
Pacific Northwest Site Office			
Science Program Direction	5,277	5,438	5,553
Princeton Plasma Physics Laboratory			
Advanced Scientific Computing Research	573	1,143	——
High Energy Physics	225	225	249
Fusion Energy Sciences	74,999	90,953	129,956
Science Laboratories Infrastructure	239	119	——
Workforce Development for Teachers and Scientists	135	115	392
Safeguards and Security	1,938	1,819	1,953
Total, Princeton Plasma Physics Laboratory	78,109	94,374	132,550
Princeton Site Office			
Science Program Direction	1,554	1,618	1,668
Sandia National Laboratories			
Basic Energy Sciences	54,225	38,808	43,822
Advanced Scientific Computing Research	10,693	4,122	2,595
Biological and Environmental Research	7,125	4,631	4,213
Fusion Energy Sciences	3,454	2,022	1,655
Workforce Development for Teachers and Scientists	——	——	258
Total, Sandia National Laboratories	75,497	49,583	52,543
Savannah River National Laboratory			
Basic Energy Sciences	200	200	200
Biological and Environmental Research	873	804	691
Fusion Energy Sciences	37	10	——
Workforce Development for Teachers and Scientists	——	——	258
Total, Savannah River National Laboratory	1,110	1,014	1,149

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Savannah River Operations Office			
Biological and Environmental Research	7,748	1,000	——
Stanford Linear Accelerator Center			
Basic Energy Sciences	95,232	150,763	215,469
Advanced Scientific Computing Research	485	57	——
Biological and Environmental Research	4,150	4,350	4,311
High Energy Physics	169,036	144,574	145,964
Science Laboratories Infrastructure	3,275	5,539	5,770
Workforce Development for Teachers and Scientists	150	135	150
Safeguards and Security	2,335	2,377	2,437
Total, Stanford Linear Accelerator Center	274,663	307,795	374,101
Stanford Site Office			
Science Program Direction	1,647	1,670	2,134
Thomas Jefferson National Accelerator Facility			
Advanced Scientific Computing Research	50	——	——
Biological and Environmental Research	810	400	400
High Energy Physics	50	480	927
Nuclear Physics	86,815	78,127	96,371
Science Laboratories Infrastructure	——	175	——
Workforce Development for Teachers and Scientists	332	95	502
Safeguards and Security	1,468	1,231	1,311
Total, Thomas Jefferson National Accelerator Facility	89,525	80,508	99,511
Thomas Jefferson Site Office			
Science Program Direction	1,407	1,457	1,500

	(dollars in thousands)		
	FY 2005	FY 2006	FY 2007
Washington Headquarters			
Basic Energy Sciences	2,054	85,299	189,160
Advanced Scientific Computing Research	1,333	49,649	104,403
Biological and Environmental Research	11,766	170,455	137,076
High Energy Physics	18,505	76,054	99,639
Nuclear Physics	1,118	16,564	32,910
Fusion Energy Sciences	958	11,021	13,683
Science Laboratories Infrastructure	——	1,505	175
Science Program Direction	63,683	68,105	75,045
Workforce Development for Teachers and Scientists	——	3,457	119
Safeguards and Security	299	2,485	437
Total, Washington Headquarters	99,716	484,594	652,647
Total, Science	3,646,317	3,601,996	4,107,315

Major Changes or Shifts by Site

Argonne National Laboratory

Basic Energy Sciences

- The **Center for Nanoscale Materials**, one of five DOE Nanoscale Science Research Centers, will be fully operational in FY 2007.

Advanced Scientific Computing Research

- The Leadership Computing activity will be initiated to provide up to 100 teraflops of high-performance computing capability with low electrical power consumption to enable scientific advances.

Science Laboratories Infrastructure

- The Argonne National Laboratory (ANL) Building Electrical Services Upgrade, Phase II project is initiated to upgrade critical portions of the electrical power distribution system in twelve research buildings and support facilities, including the Canal Water Plant supplying cooling water for site experiments.

Lawrence Berkeley National Laboratory

Basic Energy Sciences

- The Molecular Foundry, one of five DOE Nanoscale Science Research Centers, will be fully operational in FY 2007.
- Advanced Light Source (ALS) User Support Building (USB) will begin design in FY 2007. The USB will provide user support space to accommodate the growth in the number of users and future expansion of the ALS.

Advanced Scientific Computing Research

- Funding for the National Energy Research Scientific Computing Center (NERSC) and the Energy Science Network (ESnet) is increased from FY 2006. This will enable significant increases in the high performance production computing capacity and network capacity to meet SC's needs.

Science Laboratories Infrastructure

- The Seismic Safety Upgrade of Buildings, Phase I project is initiated to address the seismic upgrade of laboratory buildings where high life-safety risks have been identified.
- Demolition of the Bevatron is fully funded to free-up about 7.5% of the total building space for future missions.

Brookhaven National Laboratory

Basic Energy Sciences

- The **Center for Functional Nanomaterials**, one of five DOE Nanoscale Science Research Centers, is in its final year of construction in FY 2007.
- Support is provided for Project Engineering Design and Other Project Costs for the **National Synchrotron Light Source-II** (NSLS-II), which will be built as a replacement for NSLS-I, to enable the study of material properties and functions, particularly materials at the nanoscale, at a level of detail and precision never before possible. NSLS-II will provide the world's finest capabilities for x-ray imaging.

Science Laboratories Infrastructure

- The Renovate Science Laboratory, Phase I project is initiated to upgrade and rehabilitate existing obsolete and unsuitable laboratory facilities into modern, efficient facilities compatible with world-class scientific research.

Los Alamos National Laboratory

Basic Energy Sciences

- The **Center for Integrated Nanotechnologies**, one of five DOE Nanoscale Science Research Centers, will be fully operational in FY 2007.

Oak Ridge National Laboratory

Basic Energy Sciences

- Construction of the **Spallation Neutron Source** (SNS) will be completed during the 3rd quarter of FY 2006. Over the next two to three years, the facility will continue to fabricate and commission instruments, funded both as part of the SNS project and from other sources including non-DOE sources, and will increase power to full levels. A new Major Item of Equipment is funded in FY 2007 that will allow the fabrication of approximately four to five additional instruments for the SNS, thus nearly completing the initial suite of 24 instruments that can be accommodated in the high-power target station. Support also is provided for research and development (R&D) for a power upgrade to the SNS.
- The **Center for Nanophase Materials Sciences**, one of five DOE Nanoscale Science Research Centers, will be fully operational in FY 2007.

Advanced Scientific Computing Research

- The Leadership Computing Facility (LCF) at the Oak Ridge National Laboratory (ORNL) will be enhanced to deliver 250 teraflops of peak capability in FY 2007 for scientific applications.

Fusion Energy Sciences

- ORNL, in partnership with Princeton Plasma Physics Laboratory (PPPL), shares the responsibility for managing the U.S. contributions to the ITER project by further engaging the U.S. fusion community and industry to provide the U.S. hardware contributions and the U.S. secondees to be assigned to the ITER Organization abroad. There will be significant international cooperation between the U.S. ITER Project Office (a partnership between PPPL and ORNL), the international ITER Organization, and the other ITER parties.

Science Laboratories Infrastructure

- The Modernization of Building 4500N, Wing 4, Phase I, project is initiated to rehabilitate a facility housing many of the laboratory's chemical laboratory facilities, as well as administrative offices and the medical clinic.

Princeton Plasma Physics Laboratory

Fusion Energy Sciences

- PPPL, in partnership with ORNL, will continue to manage the U.S. contributions to the ITER project by further engaging the U.S. fusion community and industry to provide the U.S. hardware contributions and the U.S. secondees to be assigned to the ITER Organization abroad. There will be significant international cooperation and coordination between the U.S. ITER Project Office (a partnership between PPPL and ORNL), the international ITER Organization, and the other ITER parties.

Sandia National Laboratories

Basic Energy Sciences

- The **Center for Integrated Nanotechnologies**, one of five DOE Nanoscale Science Research Centers, will be fully operational in FY 2007.

Fusion Energy Sciences

- Research in plasma-facing components and plasma materials interactions for the base program will be reduced; however, Sandia is expected to play a major role in the first wall and shield area of the ITER project.

Stanford Linear Accelerator Center

Basic Energy Sciences

- The **Linac Coherent Light Source (LCLS)** will continue Project Engineering Design and construction. Funding is provided separately for preconceptual design and fabrication of instruments for the facility. Funding is also provided to partially support operation of the SLAC linac. This marks the second year of the transition to LCLS operations at SLAC.

Site Description

Ames Laboratory

Introduction

The Ames Laboratory is a program dedicated laboratory (Basic Energy Sciences). The laboratory is located on the campus of the Iowa State University, in Ames, Iowa, and consists of 12 buildings (327,664 gross square feet of space) with the average age of the buildings being 37 years. DOE does not own the land. Ames conducts fundamental research in the physical, chemical, and mathematical sciences associated with energy generation and storage and is a national center for the synthesis, analysis, and engineering of rare-earth metals and their compounds.

Basic Energy Sciences

Ames supports experimental and theoretical research on rare earth elements in novel mechanical, magnetic, and superconducting materials. Ames scientists are experts on magnets, superconductors, and quasicrystals that incorporate rare earth elements. Ames also supports theoretical studies for the prediction of molecular energetics and chemical reaction rates and provides leadership in analytical and separations chemistry.

Ames is home to the **Materials Preparation Center (MPC)**, which is dedicated to the preparation, purification, and characterization of rare-earth, alkaline-earth, and refractory metal and oxide materials. Established in 1981, the MPC is a one-of-a-kind resource that provides scientists at university, industrial, and government laboratories with research and developmental quantities of high purity materials and unique analytical and characterization services that are not available from commercial suppliers. The MPC is renowned for its technical expertise in alloy design and for creating materials that exhibit ultrafine microstructures, high strength, magnetism, and high conductivity.

Advanced Scientific Computing Research

Ames conducts research in computer science and participates on SciDAC teams. Ames also participates in Integrated Software Infrastructure Center (ISIC) activities that focus on specific software challenges confronting users of terascale computers.

Science Laboratories Infrastructure

The Science Laboratories Infrastructure (SLI) program enables Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security

This program coordinates planning, policy, implementation, and oversight in the areas of security systems, protective forces, personnel security, program management, material control and accountability, and cyber security. A protective force is maintained to provide protection of personnel, equipment, and property from acts of theft, vandalism, and sabotage through facility walk-through, monitoring of electronic alarm systems, and emergency communications.

Ames Site Office

Introduction

The Ames Site Office provides the single federal presence with responsibility for contract performance at the Ames Laboratory. This site office provides an on-site Office of Science (SC) presence with

authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Argonne National Laboratory

Introduction

The Argonne National Laboratory (ANL) in Argonne, Illinois, is a multiprogram laboratory located on 1,508 acres in suburban Chicago. The laboratory consists of 99 buildings (4.5 million gross square feet of space) with an average building age of 34 years.

Basic Energy Sciences

ANL is home to research activities in broad areas of materials and chemical sciences. It is also the site of four user facilities—the Advanced Photon Source (APS), the Intense Pulsed Neutron Source (IPNS), the Center for Nanoscale Materials (CNM), and the Electron Microscopy Center (EMC) for Materials Research.

The **Advanced Photon Source** is one of only three third-generation, hard x-ray synchrotron radiation light sources in the world. The 1,104-meter circumference facility—large enough to house a baseball park in its center—includes 34 bending magnets and 34 insertion devices, which generate a capacity of 68 beamlines for experimental research. Instruments on these beamlines attract researchers to study the structure and properties of materials in a variety of disciplines, including condensed matter physics, materials sciences, chemistry, geosciences, structural biology, medical imaging, and environmental sciences. The high-quality, reliable x-ray beams at the APS have already brought about new discoveries in materials structure.

The **Intense Pulsed Neutron Source** is a short-pulsed spallation neutron source that first operated all of its instruments in the user mode in 1981. Twelve neutron beam lines serve 14 instruments. Distinguishing characteristics of IPNS include its innovative instrumentation and source technology and its dedication to serving the users. The first generation of virtually every pulsed source neutron scattering instrument was developed at IPNS. In addition, the source and moderator technologies developed at IPNS, including uranium targets, liquid hydrogen and methane moderators, solid methane moderators, and decoupled reflectors, have impacted spallation sources worldwide. Research at IPNS is conducted on the structure of high-temperature superconductors, alloys, composites, polymers, catalysts, liquids and non-crystalline materials, materials for advanced energy technologies, and biological materials.

The **Electron Microscopy Center for Materials Research** provides *in-situ*, high-voltage and intermediate voltage, high-spatial resolution electron microscope capabilities for direct observation of ion-solid interactions during irradiation of samples with high-energy ion beams. The EMC employs both a tandem accelerator and an ion implanter in conjunction with a transmission electron microscope for simultaneous ion irradiation and electron beam microcharacterization. It is the only instrumentation of its type in the western hemisphere. The unique combination of two ion accelerators and an electron microscope permits direct, real-time, *in-situ* observation of the effects of ion bombardment of materials and consequently attracts users from around the world. Research at EMC includes microscopy based studies on high-temperature superconducting materials, irradiation effects in metals and semiconductors, phase transformations, and processing related structure and chemistry of interfaces in thin films.

The **Center for Nanoscale Materials** provides capabilities for developing new methods for self assembly of nanostructures, exploring the nanoscale physics and chemistry of nontraditional electronic materials, and creating new probes for exploring nanoscale phenomena. The CNM is organized around

six scientific themes: nanomagnetism, bio-inorganic hybrids, nanocarbon, complex oxides, nanophotonics, and theory and simulation.

Advanced Scientific Computing Research

ANL conducts basic research in mathematics and computer science, as well as research in advanced computing software tools. ANL also participates in scientific application partnerships and participates on a number of the SciDAC teams. Further, it participates in ISIC activities that focus on specific software challenges confronting users of terascale computers. As part of the Leadership Computing Facility (LCF) activity, ANL will acquire up to 100 teraflops of high-performance computing with low electrical power consumption to advance science and will continue to focus on testing and evaluating leading edge computers.

Biological and Environmental Research

ANL operates a high-throughput national user facility for protein crystallography at APS that also supports a growing environmental science community. In support of climate change research, it coordinates the operation and development of the Southern Great Plains, Tropical Western Pacific, and North Slope of Alaska Atmospheric Radiation Measurement (ARM) sites. ANL also conducts research on aerosol processes and properties and to develop and apply software to enable efficient long-term climate simulations on distributed-memory multiprocessor computing platforms. Research is conducted to understand the molecular control of genes and gene pathways in microbes. In conjunction with the ORNL and the Pacific Northwest National Laboratory (PNNL) and six universities, ANL is a participating lab in the Carbon Sequestration in Terrestrial Ecosystems (CSiTE) consortium, focusing on research to understand the processes controlling the rate of soil carbon accretion. APS supports environmental remediation sciences researchers and ANL conducts environmental remediation sciences research.

High Energy Physics

The High Energy Physics (HEP) program supports physics research and technology R&D at ANL, using unique capabilities of the laboratory in the areas of engineering and detector technology and advanced accelerator and computing techniques.

Nuclear Physics

The major ANL activity is the operation and R&D program at the Argonne Tandem Linac Accelerator System (ATLAS) National User Facility. Other activities include an on-site program of research using laser techniques (Atom Trap Trace Analysis); research programs at the Thomas Jefferson National Accelerator Facility (TJNAF), Fermi National Laboratory (Fermilab), Relativistic Heavy Ion Collider (RHIC), and DESY in Germany investigating the structure of the nucleon; generic R&D in rare isotope beam development relevant for a next generation facility in nuclear structure and astrophysics, such as the proposed Rare Isotope Accelerator (RIA) facility; theoretical calculations and investigations in subjects supporting the experimental research programs in Medium Energy and Low Energy physics; and data compilation and evaluation activities as part of the National Nuclear Data Program.

The **Argonne Tandem Linac Accelerator System** facility provides variable energy, precision beams of stable ions from protons through uranium, at energies near the Coulomb barrier (up to 10 MeV per nucleon) using a superconducting linear accelerator. Most work is performed with stable heavy-ion beams; however, about 10% of the beams are exotic (radioactive) beams. The ATLAS facility features a wide array of experimental instrumentation, including a world-leading ion-trap apparatus, the Advanced Penning Trap. The Gammasphere detector, coupled with the Fragment Mass Analyzer, is a unique world facility for measurement of nuclei at the limits of angular momentum (high-spin states). ATLAS staff are

world leaders in superconducting linear accelerator technology, with particular application in exotic beam facilities. The combination of versatile beams and powerful instruments enables ~200 users annually at ATLAS to conduct research in a broad program in nuclear structure and dynamics, nuclear astrophysics, and fundamental interaction studies. The capabilities of ATLAS are being augmented by the fabrication of a Californium source to provide new capabilities in neutron-rich radioactive beams.

Fusion Energy Sciences

Argonne contributes to the plasma facing components area of the enabling R&D program activities, focusing on modeling of plasma-materials interaction phenomena of interest for ITER and current plasma experiments.

Science Laboratories Infrastructure

The SLI program enables Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security

This program provides protection of nuclear materials, classified matter, government property, and other vital assets from unauthorized access, theft, diversion, sabotage, espionage, and other hostile acts that may cause risks to national security, the health and safety of DOE and contractor employees, the public, or the environment. Program activities include security systems, material control and accountability, information and cyber security, program management, and personnel security. In addition, a protective force is maintained. These activities ensure that the facility, personnel, and assets remain safe from potential threats.

Argonne Site Office

Introduction

The Argonne Site Office provides the single federal presence with responsibility for contract performance at the Argonne National Laboratory (ANL). This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Berkeley Site Office

Introduction

The Berkeley Site Office provides the single federal presence with responsibility for contract performance at the Lawrence Berkeley National Laboratory (LBNL). This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Brookhaven National Laboratory

Introduction

The Brookhaven National Laboratory is a multiprogram laboratory located on 5,300 acres in Upton, New York. The laboratory consists of 345 SC buildings (3.9 million gross square feet of space) with an average building age of 36 years. BNL creates and operates major facilities available to university, industrial, and government personnel for basic and applied research in the physical, biomedical, and environmental sciences, and in selected energy technologies.

Basic Energy Sciences

BNL conducts research efforts in materials and chemical sciences as well as to efforts in geosciences and biosciences. It is also the site of one BES supported user facilities—the National Synchrotron Light Source (NSLS).The **National Synchrotron Light Source** is among the largest and most diverse scientific user facilities in the world. The NSLS, commissioned in 1982, has consistently operated at >95% reliability 24 hours a day, 7 days a week, with scheduled periods for maintenance and machine studies. Adding to its breadth is the fact that the NSLS consists of two distinct electron storage rings. The x-ray storage ring is 170 meters in circumference and can accommodate 60 beamlines or experimental stations, and the vacuum-ultraviolet (VUV) storage ring can provide 25 additional beamlines around its circumference of 51 meters. Synchrotron light from the x-ray ring is used to determine the atomic structure of materials using diffraction, absorption, and imaging techniques. Experiments at the VUV ring help solve the atomic and electronic structure as well as the magnetic properties of a wide array of materials. These data are fundamentally important to virtually all of the physical and life sciences as well as providing immensely useful information for practical applications. The petroleum industry, for example, uses the NSLS to develop new catalysts for refining crude oil and making by-products like plastics.

Advanced Scientific Computing Research

BNL conducts basic research in applied mathematics and participates on SciDAC teams. It also participates in ISIC activities that focus on specific software challenges confronting users of terascale computers.

Biological and Environmental Research

BNL operates beam lines for protein crystallography at the NSLS for use by the national biological research community, research in biological structure determination, and research into new instrumentation for detecting x-rays and neutrons. BNL conducts research into new instrumentation for detecting x-rays and neutrons. Research is also conducted on the molecular mechanisms of cell responses to low doses of radiation. BNL conducts molecular nuclear medicine research developing advanced medical imaging technologies including radiopharmaceuticals for medical imaging. The 2005 BER Distinguished Scientist for Medical Sciences is at BNL.

Climate change research includes the operation of the ARM External Data resource that provides ARM investigators with data from non-ARM sources, including satellite and ground-based systems. BNL scientists form an important part of the science team in the Atmospheric Sciences program (ASP), including providing special expertise in atmospheric field campaigns and aerosol research to the program. The ASP chief scientist is at BNL. BNL scientists play a leadership role in the operation of the Free-Air Carbon Dioxide Enrichment (FACE) facility at the Duke Forest used to understand how plants respond to elevated carbon dioxide concentrations in the atmosphere.

BNL supports environmental remediation sciences research and is participating in the National Science Foundation (NSF)/DOE Environmental Molecular Sciences Institute at State University of New York-Stony Brook and has instituted a new internal initiative EnviroSuite to support a growing community of environmental users at NSLS.

High Energy Physics

The HEP program supports physics research and technology R&D at BNL, using unique resources of the laboratory, including engineering and technology for future accelerators and detectors, computational resources, and the Accelerator Test Facility.

Nuclear Physics

Research activities include use of relativistic heavy-ion beams and polarized protons in the Relativistic Heavy Ion Collider (RHIC) to investigate hot, dense nuclear matter and to understand the internal "spin" structure of the proton, respectively—parts of which are coordinated with the RIKEN BNL Research Center funded by Japan; development of future detectors for RHIC; a smaller R&D activity directed towards the ATLAS detector within the heavy-ion program at the LHC at CERN; research on the properties of neutrinos at the Sudbury Neutrino Observatory (SNO); a theory program emphasizing RHIC heavy ion and "spin" physics; and data compilation and evaluation at the National Nuclear Data Center (NNDC) that is the central U.S. site for these national and international efforts.

The **Relativistic Heavy Ion Collider** Facility, completed in 1999, is a major unique international facility currently used by about 1,000 scientists from 19 countries. RHIC uses Tandem Van de Graaff, Booster Synchrotron, and Alternating Gradient Synchrotron (AGS) accelerators in combination to inject beams into two rings of superconducting magnets of almost 4 kilometers circumference with 6 intersection regions where the beams can collide. It can accelerate and collide a variety of heavy ions, including gold beams, up to an energy of 100 GeV per nucleon. RHIC is being used to search for the predicted "quark-gluon plasma," a form of nuclear matter thought to have existed microseconds after the "Big Bang." It can also collide polarized protons with beams of energy up to 250 GeV per nucleon: a unique capability. Four detectors have been fabricated to provide complementary measurements, with some overlap in order to cross-calibrate the measurements. (1) The core of the Solenoidal Tracker at RHIC (STAR) detector is a large Time Projection Chamber (TPC) located inside a solenoidal magnet that tracks thousands of charged particles emanating from a single head-on gold-gold collision. A large modular barrel Electro-Magnetic Calorimeter (EMCal) and end-cap calorimeter measure deposited energy for high-energy charged and neutral particles and contain particle-photon discrimination capability. Other ancillary detector systems include a Silicon Vertex Tracker and forward particle tracking capabilities. A barrel Time of Flight detector upgrade (STAR TOF) is being added to significantly extend the particle identification capability of STAR detector. (2) The Pioneering High-Energy Nuclear Interacting eXperiment (PHENIX) detector has a particular focus on the measurement of rare probes at high event detection rate. It consists of two transverse spectrometer arms that can track charged particles within a magnetic field, especially to higher momentum: it provides excellent discrimination among photons, electrons, and hadrons. There are also two large muon tracking and identification systems in the forward and backward directions as well as ancillary tracker systems. Scientists using the other two smaller detectors, Phobos and Broad RAnge Hadron Magnetic Spectrometer (BRAHMS), have or are expected to complete their research programs and focus on data analysis in the near future. International participation has been essential in the implementation of all four detector systems.

The **Alternating Gradient Synchrotron** provides high intensity pulsed proton beams up to 33 GeV on fixed targets and secondary beams of kaons, muons, pions, and anti-protons. The AGS is the injector of (polarized) proton and heavy-ion beams into RHIC, and its operations are supported by the Heavy Ion subprogram as part of the RHIC facility. The AGS is also utilized for radiation damage studies of electronic systems for NASA supported work, among a variety of uses, with the support for these activities being provided by the relevant agencies.

The **Booster Synchrotron**, part of the RHIC injector, is providing heavy-ion beams to a dedicated beam line (NASA Space Radiation Laboratory) for biological and electronic systems radiation studies funded by NASA. The incremental costs for these studies are provided by NASA.

The **Tandem Van de Graaff** accelerators which serve as injectors for the Booster Synchrotron will be replaced by a modern, compact Electron Beam Ion Source (EBIS) and linac system which promises

greater efficiency, greater reliability, and lower maintenance costs as well as the potential for future upgrades. The EBIS is a joint DOE/NASA project.

The **National Nuclear Data Center (NNDC)** is the central U.S. site for national and international nuclear data and compilation efforts. The U.S. Nuclear Data program is the United States' repository for information generated in low- and intermediate-energy nuclear physics research worldwide. This information consists of both bibliographic and numeric data. The NNDC is a resource for a very broad user community in all aspects of nuclear technology, with relevance to homeland security. Nuclear Data program-funded scientists at U.S. national laboratories and universities contribute to the activities and responsibilities of the NNDC.

Science Laboratories Infrastructure

The SLI program enables Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security

The Safeguards and Security (S&S) program activities are focused on protective forces, cyber security, personnel security, security systems, information security, program management, and material control and accountability. BNL operates a transportation division to move special nuclear materials around the site. Material control and accountability efforts focus on accurately accounting for and protecting the site's special nuclear materials.

Brookhaven Site Office

Introduction

The Brookhaven Site Office provides the single federal presence with responsibility for contract performance at the Brookhaven National Laboratory (BNL). This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Chicago Office

Introduction

The Chicago Office supports the Department's programmatic missions in Science and Technology, National Nuclear Security, Energy Resources, and Environmental Quality by providing expertise and assistance in such areas as contract management, procurement, project management, engineering, facilities and infrastructure, property management, construction, human resources, financial management, general and patent law, environmental protection, quality assurance, integrated safety management, integrated safeguards and security management, nuclear material control and accountability, and emergency management. Chicago directly supports site offices responsible for program management oversight of seven major management and operating laboratories—Ames Laboratory, Argonne National Laboratory, Lawrence Berkeley National Laboratory, Brookhaven National Laboratory, Fermi National Accelerator Laboratory, Princeton Plasma Physics Laboratory, and Stanford Linear Accelerator Center—and one government-owned and government-operated Federal laboratory, New Brunswick Laboratory. Additionally, the administrative, business and technical expertise of Chicago is shared SC-wide through the Integrated Support Center concept. Chicago serves as SC's grant center, administering grants to 272 colleges/universities in all 50 states, Washington, D.C., and Puerto Rico, as determined by the DOE-SC program offices as well as non-SC offices.

Basic Energy Sciences

The BES program funds research at 190 academic institutions located in 48 states.

Advanced Scientific Computing Research

The Advanced Scientific Computing Research (ASCR) program funds research at over 70 colleges/ universities located in 24 states supporting approximately 126 principal investigators.

Biological and Environmental Research

The Biological and Environmental Research (BER) program funds research at some 220 institutions, including colleges/universities, private industry, and other federal and private research institutions located in 44 states.

High Energy Physics

The HEP program supports about 260 research groups at more than 100 colleges and universities located in 36 states, Washington, D.C., and Puerto Rico. The strength and effectiveness of the university-based program is critically important to the success of the program as a whole.

Nuclear Physics

The Nuclear Physics (NP) program funds 185 research grants at 90 colleges/universities located in 35 states and the District of Columbia. Among these are grants with the Triangle Universities Nuclear Laboratory (TUNL) which includes the High Intensity Gamma Source (HIGS) at the Duke Free Electron Laser Laboratory; Texas A&M (TAMU) Cyclotron; the Yale Tandem Van de Graaff; University of Washington Tandem Van de Graaff and Center for Experimental Nuclear and Particle Astrophysics (CENPA); and the newly established Research and Engineering Center at the Massachusetts Institute for Technology. These accelerator facilities offer niche capabilities and opportunities not available at the national user facilities, or many foreign low-energy laboratories, such as specialized sources and targets, opportunities for extended experiments, and specialized instrumentation. Also supported is the Institute for Nuclear Theory (INT) at the University of Washington, a premier international center for new initiatives and collaborations in nuclear theory research.

Fusion Energy Sciences

The Fusion Energy Sciences (FES) program funds research at more than 50 colleges and universities located in approximately 30 states. FES also funds the DIII-D tokamak experiment and related programs at General Atomics, an industrial firm located in San Diego, California.

Fermi National Accelerator Laboratory

Introduction

Fermi National Accelerator Laboratory is a program-dedicated laboratory (High Energy Physics) located on a 6,800-acre site in Batavia, Illinois. The laboratory consists of 358 buildings (2.3 million gross square feet of space) with an average building age of 39 years. Fermilab is the largest U.S. laboratory for research in high-energy physics and is second only to CERN, the European Laboratory for Particle Physics. About 2,500 scientific users, scientists from universities and laboratories throughout the U.S. and around the world, use Fermilab for their research. Fermilab's mission is the goal of high-energy physics: to understand matter at its deepest level, to identify its fundamental building blocks, and to understand how the laws of nature determine their interactions.

Advanced Scientific Computing Research

Fermilab participates in some SciDAC teams.

High Energy Physics

Fermilab operates the **Tevatron** accelerator and colliding beam facility, which consists of a four-mile ring of superconducting magnets and two large multi-purpose detectors, and is capable of accelerating protons and antiprotons to an energy of one trillion electron volts (1 TeV). The Tevatron is the highest energy proton accelerator in the world, and will remain so until the LHC begins commissioning at CERN in 2007. With the shutdown of the Large Electron-Positron (LEP) collider at CERN in 2000, the Tevatron became the only operating particle accelerator at the energy frontier. The Tevatron complex also includes the Booster and the Main Injector, pre-accelerators to the Tevatron. The Main Injector, which is used for the pre-acceleration of protons and production of antiprotons as a part of the Tevatron complex, is also used independently of the Tevatron for a 120 GeV fixed target program, including the **Neutrinos at the Main Injector (NuMI)** beamline which started operation in 2005. Fermilab is the principal experimental facility for HEP. The HEP program also supports physics research and technology R&D at Fermilab, using unique resources of the laboratory, including state-of-the-art engineering and technology for future generations of accelerators and detectors and computational resources.

Science Laboratories Infrastructure

The SLI program enables Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security

S&S program efforts are directed at maintaining protective force staffing and operations to protect personnel and the facility, and toward continuing the cyber security, program management, security systems, and material control and accountability programs to accurately account for and protect the facility's special nuclear materials. Limited funding increases would be applied to security systems and the Foreign Visits and Assignments program.

Fermi Site Office

Introduction

The Fermi Site Office provides the single federal presence with responsibility for contract performance at the Fermi National Accelerator Laboratory (Fermilab). This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Idaho National Laboratory

Introduction

Idaho National Laboratory (INL) is a multiprogram laboratory located on 572,000 acres in Idaho Falls, Idaho. Within the laboratory complex are nine major applied engineering, interim storage, and research and development facilities.

Basic Energy Sciences

INL supports studies to understand and improve the life expectancy of material systems used in engineering.

Biological and Environmental Research

INL is conducting research in subsurface science relating to clean up of the nuclear weapons complex with an emphasis on subsurface science.

Fusion Energy Sciences

Since 1978, INL has been the lead laboratory for fusion safety. As such, it has helped to develop the fusion safety database that will demonstrate the environmental and safety characteristics of both nearer term fusion devices and future fusion power plants. Research at INL focuses on the safety aspects of magnetic fusion concepts for existing and future machines, such as a burning plasma experiment, and further developing our domestic safety database using existing collaborative arrangements to conduct work on international facilities. In addition, INL has expanded their research and facilities capabilities to include tritium science activities. INL has completed fabrication of the Safety and Tritium Applied Research (STAR) Facility, which is a small tritium laboratory where the fusion program can conduct tritium material science, chemistry, and safety experiments. The STAR Facility has been declared a National User Facility. INL also coordinates codes and standards within the ITER program.

Lawrence Berkeley National Laboratory

Introduction

The Lawrence Berkeley National Laboratory is a multiprogram laboratory located in Berkeley, California, on a 200-acre site adjacent to the Berkeley campus of the University of California. The laboratory consists of 106 buildings (1.6 million gross square feet of space) with an average building age of 36 years. LBNL is dedicated to performing leading-edge research in the biological, physical, materials, chemical, energy, and computer sciences. The land is leased from the University of California.

Basic Energy Sciences

LBNL is home to major research efforts in materials and chemical sciences as well as to efforts in geosciences, engineering, and biosciences. Collocated with the University of California at Berkeley, the Laboratory benefits from regular collaborations and joint appointments with numerous outstanding faculty members. The Laboratory is the home to the research of many students and postdoctoral appointees. It is also the site of three Basic Energy Sciences (BES) supported user facilities—the Advanced Light Source (ALS), the Molecular Foundry, and the National Center for Electron Microscopy (NCEM).

The **Advanced Light Source** provides vacuum-ultraviolet light and x-rays for probing the electronic and magnetic structure of atoms, molecules, and solids, such as those for high-temperature superconductors. The high brightness and coherence of the ALS light are particularly suited for soft x-ray imaging of biological structures, environmental samples, polymers, magnetic nanostructures, and other inhomogeneous materials. Other uses of the ALS include holography, interferometry, and the study of molecules adsorbed on solid surfaces. The pulsed nature of the ALS light offers special opportunities for time resolved research, such as the dynamics of chemical reactions. Shorter wavelength x-rays are also used at structural biology experimental stations for x-ray crystallography and x-ray spectroscopy of proteins and other important biological macromolecules. The ALS is a growing facility with a lengthening portfolio of beamlines that has already been applied to make important discoveries in a wide variety of scientific disciplines. An ALS User Support Building (USB) will begin design in FY 2007.

The USB will provide high-quality user support space in sufficient quantity to accommodate the very rapid growth in the number of ALS users and to accommodate projected future expansion. The USB will contain staging areas for ALS experiments, space for a long beamline that will extend from the floor of the ALS into the USB, and temporary office space for visiting users.

The **National Center for Electron Microscopy** provides instrumentation for high-resolution, electron-optical microcharacterization of atomic structure and composition of metals, ceramics, semiconductors, superconductors, and magnetic materials. This facility contains one of the highest resolution electron microscopes in the U.S.

The Molecular Foundry provides users with instruments, techniques, and collaborators to enhance the study of the synthesis, characterization, and theory of nanoscale materials. Its focus is on the multidisciplinary development and understanding of both "soft" (biological and polymer) and "hard" (inorganic and microfabricated) nanostructured building blocks and the integration of these building blocks into complex functional assemblies. Scientific themes include inorganic nanostructures; nanofabrication; organic, polymer, and biopolymer nanostructures; biological nanostructures; imaging and manipulation of nanostructures; and theory of nanostructures. The facility offers expertise in a variety of techniques for the study of nanostructures, including electronic structure and excited-state methods, *ab initio* and classical molecular dynamics, quantum transport, and classical and quantum Monte Carlo approaches. Several research laboratories at LBNL with capabilities that complement those at the facilities also are open to Foundry users.

Advanced Scientific Computing Research

LBNL conducts basic research in the mathematics and computer science, as well as research in advanced computing software tools. It participates in several scientific application partnerships, including the partnership with the BES program in nanoscale science, and participates on a number of the SciDAC teams. LBNL manages the ESnet. ESnet is one of the worlds most effective and progressive science-related computer networks that provides worldwide access and communications to Department of Energy facilities. LBNL is also the site of the NERSC, which provides a range of high-performance, state-of-the-art computing resources that are a critical element in the success of many SC research programs. LBNL participates in ISIC activities that focus on specific software challenges confronting users of terascale computers.

Biological and Environmental Research

LBNL is one of the major national laboratory partners forming the Joint Genome Institute (JGI) whose principal goals are high-throughput DNA sequencing techniques and studies on the biological functions associated with the newly sequenced human DNA. The laboratory also conducts research on the molecular mechanisms of cell responses to low doses of radiation, on the use of model organisms to understand and characterize the human genome, and on microbial systems biology research as part of Genomics:GTL. The Chief Scientist for the Low Dose Radiation Research program and the 2005 BER Distinguished Scientists for Environmental Remediation and for Life Sciences are at LBNL. LBNL operates beam lines for determination of protein structure at the ALS for use by the national and international biological research community. The ALS is also used by a growing environmental science community. LBNL also supports the environmental remediation sciences research and the geophysical and biophysical and biochemical research capabilities for field sites in that program.

LBNL conducts research on carbon cycling and carbon sequestration on terrestrial ecosystems. It also conducts research on biological and ecological responses to climatic and atmospheric changes.

LBNL conducts research into new technologies for the detailed characterization of complex environmental contamination. It also develops scalable implementation technologies that allow widely used climate models to run effectively and efficiently on massively parallel processing supercomputers. LBNL also conducts research on terrestrial carbon cycling to understand the processes controlling the exchange of CO_2 between terrestrial ecosystems and the atmosphere.

High Energy Physics

The HEP program supports physics research and technology R&D at LBNL, using unique capabilities of the laboratory in the areas of superconducting magnet R&D, engineering and detector technology, world-forefront expertise in laser driven particle acceleration, expertise in design of advanced electronic devices, computational resources, and design of modern, complex software codes for HEP experiments.

Nuclear Physics

The Low Energy subprogram has supported operations and the research program of the 88-Inch Cyclotron, whose operations transitioned in FY 2004 from a national user facility to a dedicated in-house facility with partial operational support from other federal agencies to carry out their programs. Other activities include fabrication of a next-generation gamma-ray detector system, GRETINA; research with the STAR detector located at Brookhaven's RHIC facility; development of future detector systems for RHIC; operation of the Parallel Distributed Systems Facility aimed at heavy-ion and low energy physics computation; R&D and conceptual design activities directed towards a detector upgrade for the ALICE detector heavy-ion program at the Large Hadron Collider (LHC) at Organisation Européanne pour la Recherche Nucléaire (CERN); operation of the Sudbury Neutrino Observatory (SNO) detector in Canada and the KamLAND detector in Japan that are performing neutrino studies; development of next generation neutrino detectors; a theory program with an emphasis on relativistic heavy-ion physics; data compilation and evaluation activities supporting the National Nuclear Data Center at BNL; and a technical effort in generic R&D of rare isotope beam development with the development of electron-cyclotron resonance (ECR) ion sources.

Fusion Energy Sciences

LBNL has been conducting research in developing ion beams for applications to high energy density physics in the near term (4 to 10 years) and inertial fusion energy in the long term. Currently the laboratory has two major experimental systems for doing this research: the Neutralized Drift Compression Experiment (NDCX) and the High Current Experiment (HCX). Both experiments are directed at answering the question of how ion beams can be produced with the intensity required for research in high energy density physics and inertial fusion. LBNL conducts this research together with the Lawrence Livermore National Laboratory and Princeton Plasma Physics Laboratory through the Heavy Ion Fusion Virtual National Laboratory.

Science Laboratories Infrastructure

The SLI program enables Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security

This program provides physical protection of personnel and laboratory facilities. This is accomplished with protective forces, security systems, cyber security, program management, personnel security, and material control and accountability of special nuclear material.

Lawrence Livermore National Laboratory

Introduction

Lawrence Livermore National Laboratory (LLNL) is a multiprogram laboratory located on 821 acres in Livermore, California. This laboratory was built in Livermore as a weapons laboratory 42 miles from the campus of the University of California at Berkeley to take advantage of the expertise of the university in the physical sciences.

Basic Energy Sciences

LLNL supports research in materials sciences and in geosciences research on the sources of electromagnetic responses in crustal rocks, seismology theory and modeling, the mechanisms and kinetics of low-temperature geochemical processes and the relationships among reactive fluid flow, geochemical transport, and fracture permeability.

Advanced Scientific Computing Research

LLNL participates in base applied mathematics and computer science research and SciDAC efforts. It also participates in ISIC activities that focus on specific software challenges confronting users of terascale computers.

Biological and Environmental Research

LLNL is one of the major national laboratory partners that comprise the Joint Genome Institute (JGI) whose principal goals are high-throughput DNA sequencing and studies on the biological functions associated with newly sequenced human DNA. LLNL is developing new biocompatible materials and microelectronics for the artificial retina project. It also conducts research on the molecular mechanisms of cell responses to low doses of radiation, and on the use of model organisms to understand and characterize the human genome.

Through the program for Climate Model Diagnosis and Intercomparison, LLNL provides the international leadership to develop and apply diagnostic tools to evaluate the performance of climate models and to improve them. Virtually every climate modeling center in the world participates in this unique program. It also conducts research to improve understanding of the climate system, particularly the climate effect of clouds and aerosol properties and processes and climate change feedbacks on carbon cycling. The 2005 BER Distinguished Scientist for Climate Change Research is at LLNL.

High Energy Physics

The HEP program supports physics research and technology R&D at LLNL, using unique capabilities of the laboratory primarily in the areas of engineering and detector technology and advanced accelerator R&D.

Nuclear Physics

The LLNL program supports research in relativistic heavy-ion physics as part of the PHENIX collaboration at RHIC and the ALICE experiment at the CERN LHC, in nuclear data and compilation activities, on theoretical nuclear structure studies, and a technical effort involved in generic R&D of rare isotope beam development.

Fusion Energy Sciences

LLNL works with LBNL and PPPL through the Heavy-Ion Fusion Virtual National Laboratory in advancing the physics of heavy ion beams as a driver for inertial fusion energy in the long term and high energy density physics in the near term. It also conducts research in the concept of Fast Ignition for

applications in high energy density physics and inertial fusion energy. The LLNL program also includes collaborations with General Atomics on the DIII-D tokamak, operation of an innovative concept experiment, the Sustained Spheromak Physics Experiment at LLNL, and benchmarking of fusion physics computer models with experiments such as DIII-D. It carries out research in the simulation of turbulence and its effect on transport of heat and particles in magnetically confined plasmas. In addition, LLNL carries out research in support of magnets and plasma chamber and plasma-material interactions.

Science Laboratories Infrastructure

The SLI program enables the cleanup and removal of excess SC facilities at LLNL.

Los Alamos National Laboratory

Introduction

Los Alamos National Laboratory (LANL) is a multiprogram laboratory located on 27,000 acres in Los Alamos, New Mexico.

Basic Energy Sciences

LANL is home to a few efforts in materials sciences, chemical sciences, geosciences, and engineering. LANL supports research on strongly correlated electronic materials, high-magnetic fields, microstructures, deformation, alloys, bulk ferromagnetic glasses, mechanical properties, ion enhanced synthesis of materials, metastable phases and microstructures, and mixtures of particles in liquids.

Research is also supported to understand the electronic structure and reactivity of actinides through the study of organometallic compounds. Also supported is work to understand the chemistry of plutonium and other light actinides in both near-neutral pH conditions and under strongly alkaline conditions relevant to radioactive wastes and research in physical electrochemistry fundamental to energy storage systems. In the areas of geosciences, experimental and theoretical research is supported on rock physics, seismic imaging, the physics of the earth's magnetic field, fundamental geochemical studies of isotopic equilibrium/disequilibrium, and mineral-fluid-microbial interactions.

LANL is also the site of two BES supported user facilities: the Manuel Lujan Jr. Neutron Scattering Center (Lujan Center) and the Center for Integrated Nanotechnologies (CINT).

The **Manuel Lujan Jr. Neutron Scattering Center** provides an intense pulsed source of neutrons to a variety of spectrometers for neutron scattering studies. The Lujan Center features instruments for measurement of high-pressure and high-temperature samples, strain measurement, liquid studies, and texture measurement. The facility has a long history and extensive experience in handling actinide samples. A 30 Tesla magnet is also available for use with neutron scattering to study samples in high-magnetic fields. The Lujan Center is part of the Los Alamos Neutron Science Center (LANSCE), which is comprised of a high-power 800-MeV proton linear accelerator, a proton storage ring, production targets to the Lujan Center and the Weapons Neutron Research facility, and a variety of associated experiment areas and spectrometers for national security research and civilian research.

The **Center for Integrated Nanotechnologies** provides tools and expertise to explore the continuum from scientific discovery to the integration of nanostructures into the microworld and the macroworld. CINT is devoted to establishing the scientific principles that govern the design, performance, and integration of nanoscale materials. Through its core facility in Albuquerque, New Mexico, and its gateways to both Sandia National Laboratories and Los Alamos National Laboratory, CINT will provide access to tools and expertise to explore the continuum from scientific discovery to the integration of nanostructures into the microworld and the macroworld. CINT supports five scientific thrusts that serve

as synergistic building blocks for integration research: nano-bio-micro interfaces, nanophotonics and nanoelectronics, complex functional nanomaterials, nanomechanics, and theory and simulation.

Advanced Scientific Computing Research

LANL conducts basic research in the mathematics and computer science and in advanced computing software tools. It also participates in several scientific application partnerships and participates on a number of the SciDAC teams. LANL participates in ISIC activities that focus on specific software challenges confronting users of terascale computers.

Biological and Environmental Research

LANL is one of the major national laboratory partners that comprise the JGI whose principal goals are high-throughput DNA sequencing and studies on the biological functions associated with newly sequenced human DNA. One of LANL's roles in the JGI involves the production of high quality "finished" DNA sequence. It also conducts research on the molecular mechanisms of cell responses to low doses of radiation and on research to understand the molecular control of genes and gene pathways in microbes. Activities in structural biology include the operation of an experimental station for protein crystallography at the LANSCE for use by the national biological research community.

LANL provides the site manager for the Tropical Western Pacific ARM site. LANL also has a crucial role in the development, optimization, and validation of coupled atmospheric and oceanic general circulation models using massively parallel computers. LANL also conducts research into advanced medical imaging technologies for studying brain function including optical imaging and magnetoencephalography, novel radionuclide dosimetry and therapy, and research into new techniques for rapid characterization and sorting of mixtures of cells and cell fragments. LANL also conducts research under environmental remediation sciences with an emphasis on biological processes associated with plutonium mobility in the environment. LANL is participating in the National Science Foundation (NSF)/DOE Environmental Molecular Sciences Institute at the Pennsylvania State University.

High Energy Physics

The HEP program supports physics research and technology R&D at LANL, using unique capabilities of the laboratory primarily in the areas of theoretical studies, engineering, and detector technology.

Nuclear Physics

NP supports a broad program of research including: a program of neutron beam research that utilized beams from LANSCE facility to make fundamental physics measurements (to be completed in FY 2006); the conceptual design and R&D of an experiment to search for the electric dipole moment of the neutron; a research and development effort in relativistic heavy-ions using the PHENIX detector at the RHIC and development of next generation instrumentation for RHIC; research directed at the study of the quark substructure of the nucleon in experiments at Fermilab, and the "spin" structure of nucleons at RHIC using polarized proton beams; research at the Sudbury Neutrino Observatory (SNO) and at MiniBooNE directed at studies of the properties of neutrinos including development of the next generation detector; a broad program of theoretical research; nuclear data and compilation activities as part of the U.S. Nuclear Data program; and a technical effort involved in rare isotope beam development.

Fusion Energy Sciences

LANL has developed a substantial experimental system for research in Magnetized Target Fusion, one of the major innovative confinement concepts in magnetic alternates. The laboratory leads research in a high-density, compact plasma configuration called Field Reversed Configuration. LANL supports the

creation of computer codes for modeling the stability of magnetically confined plasmas, including tokamaks and innovative confinement concepts. The work also provides theoretical and computational support for the Madison Symmetric Torus experiment, a proof-of-principle experiment in reversed field pinch at the University of Wisconsin in Madison. LANL develops advanced diagnostics for the National Spherical Torus Experiment (NSTX) at PPPL and other fusion experiments, such as the Rotating Magnetic Field as a current drive mechanism for the Field Reversed Configuration Experiment at the University of Washington in Seattle. The laboratory is also doing research in Inertial Electrostatic Confinement, another innovative confinement concept. LANL also supports the tritium processing activities needed for ITER.

National Renewable Energy Laboratory

Introduction

The National Renewable Energy Laboratory (NREL) is a program-dedicated laboratory (Solar) located on 300 acres in Golden, Colorado. NREL was built to emphasize renewable energy technologies such as photovoltaics and other means of exploiting solar energy. It is the world leader in renewable energy technology development. Since its inception in 1977, NREL's sole mission has been to develop renewable energy and energy efficiency technologies and transfer these technologies to the private sector.

Basic Energy Sciences

NREL supports basic research efforts that underpin this technological emphasis at the laboratory; e.g., on overcoming semiconductor doping limits, novel and ordered semiconductor alloys, and theoretical and experimental studies of properties of advanced semiconductor alloys for prototype solar cells. It also supports research addressing the fundamental understanding of solid-state, artificial photosynthetic systems. This research includes the preparation and study of novel dye-sensitized semiconductor electrodes, characterization of the photophysical and chemical properties of quantum dots, and study of charge carrier dynamics in semiconductors.

Oak Ridge Institute for Science and Education

Introduction

The Oak Ridge Institute for Science and Education, operated by Oak Ridge Associated Universities (ORAU), is located on a 150-acre site in Oak Ridge, Tennessee. Established in 1946, ORAU is a university consortium leveraging the scientific strength of major research institutions to advance science and education by partnering with national laboratories, government agencies, and private industry. ORISE focuses on scientific initiatives to research health risks from occupational hazards, assess environmental cleanup, respond to radiation medical emergencies, support national security and emergency preparedness, and educate the next generation of scientists.

Basic Energy Sciences

ORISE supports a consortium of university and industry scientists to share the ORNL research station at NSLS to study the atomic and molecular structure of matter (known as ORSOAR, the Oak Ridge Synchrotron Organization for Advanced Research). ORISE provides administrative support for panel reviews and site reviews. It also assists with the administration of topical scientific workshops and provides administrative support for other activities such as for the reviews of construction projects. ORISE manages the **Shared Research Equipment (SHaRE)** program at ORNL. The SHaRE program makes available state-of-the-art electron beam microcharacterization facilities for collaboration with researchers from universities, industry, and other government laboratories.

Advanced Scientific Computing Research

ORISE provides support for education activities.

Biological and Environmental Research

ORISE coordinates research fellowship programs and manages the DOE-NSF program supporting graduate students to attend the Lindau Meeting of Nobel Laureates. It also coordinates activities associated with the peer review of most of the submitted research proposals.

High Energy Physics

ORISE provides support to the HEP program in the area of program planning and review.

Nuclear Physics

ORISE supports the Holifield Radioactive Ion Beam Facility (HRIBF) and its research program through a close collaboration with university researchers using HRIBF.

Fusion Energy Sciences

ORISE supports the operation of the Fusion Energy Sciences Advisory Committee (FESAC) and administrative aspects of some FES program peer reviews. It also acts as an independent and unbiased agent to administer the FES Graduate and Postgraduate Fellowship programs, in conjunction with FES, the ORO, participating universities, DOE laboratories, and industries.

Science Laboratories Infrastructure

The SLI program enables the cleanup and removal of excess facilities at the facility.

Safeguards and Security

The S&S program at ORISE provides physical protection/protective force services by employing unarmed security officers. The facilities are designated as property protection areas for the purpose of protecting government-owned assets. In addition to the government-owned facilities and personal property, ORISE possesses small quantities of nuclear materials that must be protected. The program includes information security, program management, personnel security, protective forces, security systems, and cyber security.

Oak Ridge National Laboratory

Introduction

The Oak Ridge National Laboratory is a multiprogram laboratory located on the 24,000 acre reservation at Oak Ridge, Tennessee. The laboratory's 1,100 acre main site on Bethel Valley Road contains 303 buildings (3.5 million gross square feet of space) with an average building age of 35 years. Scientists and engineers at ORNL conduct basic and applied research and development to create scientific knowledge and technological solutions that strengthen the nation's leadership in key areas of science; increase the availability of clean, abundant energy; restore and protect the environment; and contribute to national security. The laboratory supports almost every major Departmental mission in science, defense, energy resources, and environmental quality. It provides world-class scientific research capability while advancing scientific knowledge through such major Departmental initiatives as the Spallation Neutron Source (SNS), the Supercomputing Program, Nanoscience Research, complex biological systems, and ITER. In the defense mission arena, programs include those which protect our Homeland and National Security by applying advanced science and nuclear technology to the Nation's defense. Through the Nuclear Nonproliferation Program, Oak Ridge supports the development and

coordination of the implementation of domestic and international policy aimed at reducing threats, both internal and external, to the U.S. from weapons of mass destruction. The Laboratory also supports various Energy Efficiency and Renewable Energy programs and facilitates the R&D of energy efficiency and renewable energy technologies.

Basic Energy Sciences

ORNL is home to major research efforts in materials and chemical sciences with additional programs in engineering and geosciences. ORNL has perhaps the most comprehensive materials research program in the country. It is also the site of three BES supported user facilities—the Spallation Neutron Source (SNS), which is under construction and scheduled for commissioning in FY 2006; the High Flux Isotope Reactor (HFIR); and the Center for Nanophase Materials Sciences (CNMS). ORNL has perhaps the most comprehensive materials research program in the country.

The **Spallation Neutron Source** is a next-generation short-pulse spallation neutron source for neutron scattering that is significantly more powerful (by about a factor of 10) than the best spallation neutron source now in existence. The SNS consists of a linac-ring accelerator system that delivers short (microsecond) proton pulses to a target/moderator system where neutrons are produced by a process called spallation. The neutrons so produced are then used for neutron scattering experiments. Specially designed scientific instruments use these pulsed neutron beams for a wide variety of investigations. There is initially one target station that can accommodate 24 instruments; the potential exists for adding more instruments and a second target station later.

The **High Flux Isotope Reactor** is a light-water cooled and moderated reactor that began full-power operations in 1966. HFIR operates at 85 megawatts to provide state-of-the-art facilities for neutron scattering, materials irradiation, and neutron activation analysis and is the world's leading source of elements heavier than plutonium for research, medicine, and industrial applications. The neutron scattering experiments at HFIR reveal the structure and dynamics of a very wide range of materials. The neutron-scattering instruments installed on the four horizontal beam tubes are used in fundamental studies of materials of interest to solid-state physicists, chemists, biologists, polymer scientists, metallurgists, and colloid scientists. Recently, a number of improvements at HFIR have increased its neutron scattering capabilities to 14 state-of-the-art neutron scattering instruments on the world’s brightest beams of steady-state neutrons. These upgrades include the installation of larger beam tubes and shutters, a high-performance liquid hydrogen cold source, and neutron scattering instrumentation.

The **Center for Nanophase Materials Sciences** integrates nanoscale science with neutron science; synthesis science; and theory, modeling, and simulation. Scientific themes include macromolecular complex systems, functional nanomaterials such as carbon nanotubes, nanoscale magnetism and transport, catalysis and nano building blocks, and nanofabrication.

Advanced Scientific Computing Research

ORNL conducts basic research in the mathematics and computer science, as well as research in advanced computing software tools. It also participates in several scientific application partnerships and participates on a number of the SciDAC teams. Integrated Software Infrastructure Center activities are focused on specific software challenges confronting users of terascale computers. The Center for Computational Sciences (CCS), located at ORNL, provides high-end capability computing services to SciDAC teams and other DOE users. ORNL was selected by DOE to develop Leadership Computing Facility (LCF) for science to revitalize the U.S. effort in high end computing.

Biological and Environmental Research

ORNL has a leadership role in research focused on the ecological aspects of global environmental change. It supports basic research through ecosystem-scale manipulative experiments in the field, through laboratory experiments involving model ecosystems exposed to global change factors, and through development and testing of computer simulation models designed to explain and predict effects of climatic change on the structure and functioning of terrestrial ecosystems. ORNL is the home of a FACE experiment which facilitates research on terrestrial carbon processes and the development of terrestrial carbon cycle models. It also houses the ARM archive, providing data to ARM scientists and to the general scientific community. ORNL, in conjunction with ANL and PNNL and six universities, plays a principle role in the CSiTE consortium which is focusing on research to enhance the capacity, rates, and longevity of carbon sequestration in terrestrial ecosystems. ORNL scientists provide improvement in formulations and numerical methods necessary to improve climate models. ORNL scientists make important contributions to the environmental remediation sciences research programs, providing special leadership in microbiology applied in the field. ORNL also manages the environmental remediation sciences research Field Research Center, a field site for developing and testing bioremediation methods for metal and radionuclide contaminants in subsurface environments.

ORNL is one of the major national laboratory partners that comprise the JGI whose principal goals are high-throughput DNA sequencing and studies on the biological functions associated with newly sequenced human DNA. One of ORNL's roles in the JGI involves the annotation (assigning biological functions to genes) of completed genomic sequences and mouse genetics. ORNL conducts research on widely used data analysis tools and information resources that can be automated to provide information on the biological function of newly discovered genes identified in high-throughput DNA sequencing projects. ORNL conducts microbial systems biology research as part of Genomics:GTL. The laboratory also operates the Laboratory for Comparative and Functional Genomics, or "Mouse House," which uses mice as model organisms to understand and characterize the human genome. The laboratory conducts research into new instrumentation for the analytical chemistry of complex environmental contamination using new types of biosensors. The laboratory is developing a new experimental station for biological small angle neutron scattering.

High Energy Physics

The HEP program supports a small research effort using unique capabilities of ORNL primarily in the area of particle beam shielding calculations.

Nuclear Physics

The major effort at ORNL is the research, development, and operations of the HRIBF that is operated as a National User Facility. Also supported are a relativistic heavy-ion group that is involved in a research program using the PHENIX detector at RHIC and ALICE at the LHC; the development of the Fundamental Neutron Physics Beamline at SNS; a theoretical nuclear physics effort that emphasizes investigations of nuclear structure and astrophysics; nuclear data and compilation activities that support the national nuclear data effort; and a technical effort involved in rare isotope beam development.

The **Holifield Radioactive Ion Beam Facility** is the only radioactive nuclear beam facility in the U.S. to use the isotope separator on-line (ISOL) method and is used annually by about 90 scientists for studies in nuclear structure, dynamics, and astrophysics using radioactive beams. The HRIBF accelerates secondary radioactive beams to higher energies (up to 10 MeV per nucleon) than any other facility in the world with a broad selection of ions. The HRIBF conducts R&D on ion sources and low energy ion transport for radioactive beams. The capabilities of HRIBF are being augmented by the construction of

the High Power Test Laboratory (HPTL) which will provide capabilities which will be unique in the world for the development and testing of new ion source techniques.

Fusion Energy Sciences

ORNL develops a broad range of components that are critical for improving the research capability of fusion experiments located at other institutions and that are essential for developing fusion as an environmentally acceptable energy source. The laboratory is a leader in the theory of heating of plasmas by electromagnetic waves, antenna design, and design and modeling of pellet injectors to fuel the plasma and control the density of plasma particles. The laboratory is also the site of the Controlled Fusion Atomic Data Center and its supporting research programs. While some ORNL scientists are located full-time at off-site locations, others carry out their collaborations with short visits to the host institutions, followed by extensive computer communications from ORNL for data analysis and interpretation, and theoretical studies. ORNL is also a leader in stellarator theory and design and is a major partner with PPPL on the National Compact Stellarator Experiment (NCSX) being built at PPPL. ORNL, in partnership with PPPL, shares responsibility for managing the U.S. ITER Project Office, effective July 2004. ORNL has led the fusion materials science program. This program will be reduced significantly in FY 2007.

Science Laboratories Infrastructure

The SLI program enables Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security

The S&S program includes security systems, information security, cyber security, personnel security, material control and accountability, and program management. Program planning functions at the laboratory provide for short- and long-range strategic planning, and special safeguards plans associated with both day-to-day protection of site-wide security interests and preparation for contingency operations. Additionally, ORNL is responsible for providing overall laboratory policy direction and oversight in the security arena; for conducting recurring programmatic self-assessments; for assuring a viable ORNL Foreign Ownership, Control or Influence (FOCI) program is in place; and for identifying, tracking, and obtaining closure on findings or deficiencies noted during inspections, surveys, or assessments of S&S programs.

Oak Ridge Office

Introduction

The Oak Ridge Office (ORO) directly provides corporate support (i.e., procurement, legal, finance, budget, human resources, and facilities and infrastructure) to site offices responsible for program management oversight of two major management and operating laboratories: PNNL and TJNAF. Oak Ridge also oversees the Oak Ridge Reservation and other DOE facilities in the City of Oak Ridge. Together on the Reservation and in the City of Oak Ridge there are 24 buildings (362,700 square feet) with a total replacement plant value (RPV) of $29.0 million. The RPV of the roads and other structures on the Reservation is $48.2 million. As a result of the recent A-76 competition for financial services, the Oak Ridge Financial Service Center provides payment services for the entire Department of Energy/NNSA, nation-wide. The administrative, business, and technical expertise of Oak Ridge is shared SC-wide through the Integrated Support Center concept. The ORO Manager is also the single Federal official with responsibility for contract performance at ORNL and the Oak Ridge Institute for

Science and Education (ORISE). The Manager provides on-site presence for ORNL and ORISE with authority encompassing contract management, program and project implementation, Federal stewardship, and internal operations.

Science Laboratories Infrastructure

The Oak Ridge Landlord subprogram provides for centralized ORO infrastructure requirements and general operating costs for activities (e.g., roads) on the Oak Ridge Reservation outside plant fences plus DOE facilities in the town of Oak Ridge, PILT, and other needs related to landlord activities.

Safeguards and Security

The S&S program provides for contractor protective forces for the Federal office building and ORNL. This includes protection of a category 1 Special Nuclear Material Facility, Building 3019. Other small activities include security systems, information security, and personnel security.

Office of Scientific and Technical Information

Introduction

The Office of Scientific and Technical Information (OSTI) is located on an 8-acre site in Oak Ridge, Tennessee. The 134,000 square foot OSTI facility houses both Federal and contractor staff; the E-Government infrastructure handling over 15 million downloads and views of DOE's R&D results per year; and over 1.2 million classified and unclassified documents dating from the Manhattan Project to the present. These resources enable OSTI to fulfill its mission to advance science and sustain technological creativity by making R&D findings available and useful to DOE researchers and the American people. OSTI hosts web sites for BER programs and maintains on-line databases.

Safeguards and Security

The S&S program physical security is achieved through a graded protection system including protective forces, security systems, cyber security and program management. The S&S program also incorporates lock and key control, closed circuit television (CCTV), electronic access control and physical access control whereby visitors and employees attain building access via a lobby post where a receptionist is stationed.

Pacific Northwest National Laboratory

Introduction

Pacific Northwest National Laboratory is a multiprogram laboratory located on 132 acres at the Department's Hanford site in Richland, Washington. The laboratory consists of one 8 year old government-owned building (200,000 gross square feet of space). PNNL conducts research in the area of environmental science and technology and carries out related national security, energy, and human health

Basic Energy Sciences

PNNL supports research in interfacial and surface chemistry, inorganic molecular clusters, analytical chemistry, and applications of theoretical chemistry to understanding surface. Geosciences research includes theoretical and experimental studies to improve our understanding of phase change phenomena in microchannels. Also supported is research on stress corrosion and corrosion fatigue, interfacial dynamics during heterogeneous deformation, irradiation assisted stress corrosion cracking, bulk defect and defect processing in ceramics, chemistry and physics of ceramic surfaces and interfacial deformation mechanisms in aluminum alloys.

Advanced Scientific Computing Research

PNNL conducts basic research in the mathematics and computer science, as well as research in advanced computing software tools. It also participates in several scientific application partnerships, participates on a number of the SciDAC teams, and participates in Integrated Software Infrastructure Center activities that focus on specific software challenges confronting users of terascale computers.

Biological and Environmental Research

PNNL is home to the William R. Wiley **Environmental Molecular Sciences Laboratory (EMSL),** a national scientific user facility. PNNL scientists, including EMSL scientists, play important roles in performing environmental remediation sciences research with representation in most areas within that program. PNNL operates the unique ultrahigh field mass spectrometry and nuclear magnetic resonance spectrometry instruments as well as a wide variety of other cutting edge analytical capabilities at the EMSL for use by the national research community.

PNNL provides expertise in research on aerosol properties and processes and in field campaigns for atmospheric sampling and analysis of aerosols. The Atmospheric Radiation Measurement (ARM) program office is located at PNNL, as is the project manager for the ARM engineering activity; this provides invaluable logistical, technical, and scientific expertise for the program. PNNL also conducts research on improving methods and models for assessing the costs and benefits of climate change and of various different options for mitigating and/or adapting to such charges. It also conducts research into new instrumentation for microscopic imaging of biological systems and for characterization of complex radioactive contaminants by highly automated instruments.

PNNL is one of the major national laboratory partners that comprise the JGI whose principal goals are high-throughput DNA sequencing and studies on the biological functions associated with newly sequenced human DNA. One of PNNL's roles in the JGI involves proteomics research (identifying all the proteins found in cells). PNNL conducts research on the molecular mechanisms of cell responses to low doses of radiation and on the development of high throughput approaches for characterizing all of the proteins (the proteome) being expressed by cells under specific environmental conditions. PNNL conducts microbial systems biology research as part of Genomics:GTL. The Chief Scientist for the Genomics: GTL program is at PNNL.

PNNL, in conjunction with ANL and ORNL and six universities, plays an important role in the CSiTE consortium, focusing on the role of soil microbial processes in carbon sequestration. PNNL also conducts research on the integrated assessment of global climate change.

Fusion Energy Sciences

PNNL has focused on research on materials that can survive in a fusion neutron environment. Experienced scientists and engineers at PNNL provide leadership in the evaluation of ceramic matrix composites for fusion applications and support work on vanadium, copper, and ferrite steels as part of the U.S. fusion materials team. These programs will be reduced significantly in FY 2007.

Science Laboratories Infrastructure

The SLI program enables Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security

The PNNL S&S program consists of program management, physical security systems, protection operations, information security, cyber security, personnel security and material control and accountability.

Pacific Northwest Site Office

Introduction

The Pacific Northwest Site Office provides the single federal presence with responsibility for contract performance at PNNL. This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Princeton Plasma Physics Laboratory

Introduction

Princeton Plasma Physics Laboratory (PPPL) is a program-dedicated laboratory (Fusion Energy Sciences) located on 88.5 acres in Plainsboro, New Jersey. The laboratory consists of 35 buildings (725,000 gross square feet of space) with an average building age of 30 years. DOE does not own the land.

Advanced Scientific Computing Research

PPPL participates in several SciDAC projects.

High Energy Physics

The HEP program supports a small theoretical research effort at PPPL using unique capabilities of the laboratory in the area of advanced accelerator R&D.

Fusion Energy Sciences

PPPL is the only U.S. Department of Energy (DOE) laboratory devoted primarily to plasma and fusion science. The laboratory hosts experimental facilities used by multi-institutional research teams and also sends researchers and specialized equipment to other fusion facilities in the United States and abroad. PPPL is the host for the NSTX, which is an innovative toroidal confinement device, closely related to the tokamak, and has started construction of another innovative toroidal concept, the NCSX, a compact stellarator. PPPL scientists and engineers have significant involvement in the DIII-D and Alcator C-Mod tokamaks and the NSF Center for Magnetic Self-Organization in Laboratory and Astrophysical Plasmas in the U.S. and several large tokamak facilities abroad, including JET (Europe), JT-60U (Japan), and KSTAR (Korea). This research is focused on developing the scientific understanding and innovations required for an attractive fusion energy source. PPPL scientists are also involved in several basic plasma science experiments, ranging from magnetic reconnection to plasma processing. PPPL also has a large theory group that does research in the areas of turbulence and transport, equilibrium and stability, wave-plasma interaction, and heavy ion accelerator physics. PPPL, LBNL, and LLNL currently work together in advancing the physics of heavy ion drivers through the heavy ion beams Fusion Virtual National Laboratory. Effective July 2004, PPPL, in partnership with ORNL, was selected to manage the U.S. ITER Project Office. Through its association with Princeton University, PPPL provides high quality education in fusion-related sciences, having produced more than 185 Ph.D. graduates since its founding in 1951.

Science Laboratories Infrastructure

The SLI program enables Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security

The S&S program provides for protection of nuclear materials, government property, and other vital assets from unauthorized access, theft, diversion, sabotage, or other hostile acts. These activities result in reduced risk to national security and the health and safety of DOE and contractor employees, the public, and the environment. The PPPL S&S program consists of protective forces, security systems, cyber security, and program management.

Princeton Site Office

Introduction

The Princeton Site Office provides the single federal presence with responsibility for contract performance at the Princeton Plasma Physics Laboratory. This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Sandia National Laboratories

Introduction

Sandia National Laboratories (SNL) is a multiprogram laboratory located on 3,700 acres in Albuquerque, New Mexico (SNL/NM), with sites in Livermore, California (SNL/CA), and Tonopah, Nevada.

Basic Energy Sciences

SNL is home to significant research efforts in materials and chemical sciences with additional programs in engineering and geosciences. SNL/CA is also the site of the Combustion Research Facility (CRF). SNL has a historic emphasis on electronic components needed for Defense Programs. The laboratory has very modern facilities in which unusual microcircuits and structures can be fabricated out of various semiconductors. It is also the site of two BES supported user facilities—the Combustion Research Facility (CRF) and the Center for Integrated Nanotechnologies (CINT).

The **Combustion Research Facility** at SNL/CA is an internationally recognized facility for the study of combustion science and technology. In-house efforts combine theory, modeling, and experiment including diagnostic development, kinetics, and dynamics. Several innovative non-intrusive optical diagnostics such as degenerate four-wave mixing, cavity ring-down spectroscopies, high resolution optical spectroscopy, and ion-imaging techniques have been developed to characterize combustion intermediates. Basic research is often conducted in close collaboration with applied programs. A principal effort in turbulent combustion is coordinated among the chemical physics program, and programs in Fossil Energy and Energy Efficiency and Renewable Energy.

The **Center for Integrated Nanotechnologies** provides tools and expertise to explore the continuum from scientific discovery to the integration of nanostructures into the microworld and the macroworld. CINT is devoted to establishing the scientific principles that govern the design, performance, and integration of nanoscale materials. Through its core facility in Albuquerque, New Mexico, and its gateways to both Sandia National Laboratories and Los Alamos National Laboratory, CINT will provide

access to tools and expertise to explore the continuum from scientific discovery to the integration of nanostructures into the microworld and the macroworld. CINT supports five scientific thrusts that serve as synergistic building blocks for integration research: nano-bio-micro interfaces, nanophotonics and nanoelectronics, complex functional nanomaterials, nanomechanics, and theory and simulation.

Advanced Scientific Computing Research

SNL conducts basic research in mathematics and computer science, as well as research in advanced computing software tools. It also participates in several scientific application partnerships, participates on a number of the SciDAC teams, and participates in ISIC activities that focus on specific software challenges confronting users of terascale computers.

Biological and Environmental Research

SNL provides the site manager for the North Slope of Alaska ARM site. The chief scientist for the ARM-Unmanned Aerial Vehicles (UAV) program is at SNL, and SNL takes the lead role in coordinating and executing ARM-UAV missions. The laboratory conducts advanced research and technology development in robotics, smart medical instruments, microelectronic fabrication of the artificial retina, and computational modeling of biological systems, and fundamental chemistry for the treatment of high-level waste.

To support environmental cleanup, SNL conducts research into novel sensors for analytical chemistry of contaminated environments.

Fusion Energy Sciences

Sandia plays a lead role in developing components for fusion devices through the study of plasma interactions with materials, the behavior of materials exposed to high heat fluxes, and the interface of plasmas and the walls of fusion devices. It selects, specifies, and develops materials for components exposed to high heat and particles fluxes and conducts extensive analysis of prototypes to qualify components before their use in fusion devices. Materials samples and prototypes are tested in Sandia's Plasma Materials Test Facility, which uses high-power electron beams to simulate the high heat fluxes expected in fusion environments. Materials and components are exposed to tritium-containing plasmas in the Tritium Plasma Experiment located in the STAR facility at INL. Tested materials are characterized using Sandia's accelerator facilities for ion beam analysis. Sandia supports a wide variety of domestic and international experiments in the areas of tritium inventory removal, materials postmortem analysis, diagnostics development, and component design and testing. A number of these activities will be reduced in FY 2007. Sandia also works with LBNL through the Heavy Ion-Fusion Virtual National Laboratory in developing high-brightness ion source and other science issues of heavy ion beams. Sandia serves an important role in the design and analysis activities related to the ITER first wall components, including related R&D.

Savannah River National Laboratory

Introduction

The Savannah River National Laboratory (SRNL) is a multiprogram laboratory located on approximately 34 acres in Aiken, South Carolina. SRNL provides scientific and technical support for the site's missions, working in partnership with the site's operating divisions.

Biological and Environmental Research

SRNL scientists support environmental remediation sciences research program in the area of bioimmobilization of heavy metals and radionuclides.

Stanford Linear Accelerator Center

Introduction

The Stanford Linear Accelerator Center (SLAC) is located on 426 acres of Stanford University land in Menlo Park, California, and is also the home of the Stanford Synchrotron Radiation Laboratory (SSRL). The facility is now comprised of 25 experimental stations and is used each year by over 700 researchers from industry, government laboratories, and universities. SLAC (including SSRL) consists of 114 buildings (1.7 million gross square feet of space) with the average age of 29 years. SLAC is a laboratory dedicated to the design, construction, and operation of state-of-the-art electron accelerators and related experimental facilities for use in high-energy physics and synchrotron radiation research. SLAC operates the 2 mile long Stanford Linear Accelerator which began operating in 1966. The SSRL was built in 1974 to utilize the intense x-ray beams from the Stanford Positron Electron Accelerating Ring (SPEAR) that was built for particle physics by the SLAC laboratory. Over the years, SSRL grew to be one of the main innovators in the production and use of synchrotron radiation with the development of wigglers and undulators that form the basis of all third generation synchrotron sources.

Basic Energy Sciences

SLAC is the home of the **Stanford Synchrotron Radiation Laboratory** and peer-reviewed research projects associated with SSRL. The facility is used by researchers from industry, government laboratories, and universities. These include astronomers, biologists, chemical engineers, chemists, electrical engineers, environmental scientists, geologists, materials scientists, and physicists. A research program is conducted at SSRL with emphasis in both the x-ray and ultraviolet regions of the spectrum. SSRL scientists are experts in photoemission studies of high-temperature superconductors and in x-ray scattering. The SPEAR 3 upgrade at SSRL provides major improvements that will increase the brightness of the ring for all experimental stations.

Advanced Scientific Computing Research

SLAC participates on a number of SciDAC teams.

Biological and Environmental Research

SLAC operates nine SSRL beam lines for structural molecular biology. This program involves synchrotron radiation-based research and technology developments in structural molecular biology that focus on protein crystallography, x-ray small angle scattering diffraction, and x-ray absorption spectroscopy for determining the structures of complex proteins of many biological consequences. Beamlines at SSRL also serve the growing environmental science user community.

High Energy Physics

SLAC operates the **B-factory** and its detector, BaBar, and a small program of experiments in accelerator science and technology. The B-factory, a high energy electron-positron collider, was constructed to support a search for and high-precision study of CP symmetry violation in the B meson system. All of these facilities make use of the two-mile long linear accelerator, or linac. The HEP program also supports physics research and technology R&D at SLAC, using unique resources of the laboratory, including engineering and detector technology, advanced accelerator technology, and computational resources.

Science Laboratories Infrastructure

The SLI program enables Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security

The S&S program focuses on reducing the risk to DOE national facilities and assets. The program consists primarily of protective forces, security systems, program management, and cyber security program elements.

Stanford Site Office

Introduction

The Stanford Site Office provides the single federal presence with responsibility for contract performance at the Stanford Linear Accelerator Center (SLAC). This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Thomas Jefferson National Accelerator Facility

Introduction

Thomas Jefferson National Accelerator Facility is an Office of Science laboratory (Nuclear Physics) located on 162 acres (DOE-owned) in Newport News, Virginia focused on the exploration of nuclear and nucleon structure. The laboratory consists of 62 buildings with an average building age of 14 years, 2 state leased buildings, 23 real property trailers, and 10 other structures and facilities totaling over 764,000 gross square feet of space. The laboratory was constructed over the period FY 1987–1995.

Biological and Environmental Research

BER supports the development of advanced imaging instrumentation at TJNAF that will ultimately be used in the next generation medical imaging systems.

High Energy Physics

The HEP program supports an R&D effort at TJNAF on accelerator technology, using the unique expertise of the laboratory in the area of superconducting radiofrequency systems for particle acceleration.

Nuclear Physics

The centerpiece of TJNAF is the **Continuous Electron Beam Accelerator Facility (CEBAF)**, a unique international electron-beam user facility for the investigation of nuclear and nucleon structure based on the underlying quark substructure. The facility has a user community of ~1,200 researchers and is used annually by ~800 U.S. and foreign researchers. Polarized electron beams up to 5.7 GeV can be provided by CEBAF simultaneously to 3 different experimental halls. Hall A is designed for spectroscopy and few-body measurements. Hall B has a large acceptance detector, CLAS, for detecting multiple charged particles coming from a scattering reaction. Hall C is designed for flexibility to incorporate a wide variety of different experiments. Its core equipment consists of two medium resolution spectrometers for detecting high momentum or unstable particles. The G0 detector, a joint NSF-DOE project in Hall C, will allow a detailed mapping of the strange quark contribution to nucleon structure. Also in Hall C, a new detector, Q-weak, is being developed to measure the weak charge of the proton by a collaboration of laboratory and university groups in partnership with the NSF. TJNAF supports a group that does theoretical calculations and investigations in subjects supporting the experimental research programs in Medium Energy Physics. TJNAF research and engineering staff are world experts in Superconducting Radio-Frequency (SRF) accelerator technology; their expertise is being used in the development of the

12 GeV Upgrade for CEBAF as well as for other accelerator projects such as the Spallation Neutron Source.

Science Laboratories Infrastructure

The SLI program enables Departmental research missions at the laboratory by funding line item construction to maintain the general purpose infrastructure, and the cleanup and removal of excess facilities.

Safeguards and Security

TJNAF has a guard force (protective force) that provides 24-hour services for the accelerator site and after-hours property protection security for the entire site. Other security programs include cyber security, program management, material control and accountability, and security systems.

Thomas Jefferson Site Office

Introduction

The Thomas Jefferson Site Office provides the single federal presence with responsibility for contract performance at Thomas Jefferson National Accelerator Facility (TJNAF). This site office provides an on-site SC presence with authority encompassing contract management, program and project implementation, federal stewardship, and internal operations.

Washington Headquarters

SC Headquarters, located in the Washington, D.C. area, supports the SC mission by funding Federal staff responsible for directing, administering, and supporting a broad spectrum of scientific disciplines. These disciplines include the HEP, NP, BES, BER, FES, ASCR, and WDTS programs. In addition, Federal staff are responsible for SC-wide management, operational policy, and technical/administrative support activities in budget and planning; information technology; infrastructure management; construction management; safeguards and security; environment, safety and health; and general administration. Funded expenses include salaries, benefits, travel, general administrative support services and technical expertise, information technology maintenance and enhancements, as well as other costs funded through interdepartmental transfers and interagency transfers.