

**Department of Energy (DOE)
FY 2004 Report to Congress**

**Laboratory Directed Research and Development
(LDRD)**

at the

DOE National Laboratories



December 2004

Table of Contents

Executive Summary		1
1. Introduction		2
1.1 Background		2
1.2 Purpose of the Report		2
2. FY 2004 LDRD Program		4
2.1 Financial Information		4
2.1.1 LDRD Funding Mechanism		4
2.1.2 FY 2004 Expenditures		4
2.1.3 FY 2004 LDRD Allocation Percentages		5
2.2 Workforce Development		7
2.3 LDRD and the Work for Others (WFO) Program		7
3. Report Conclusions		9
Note 1	Listing of FY 2004 Projects	
Appendix 1	Secretarial Affirmation	A1
Appendix 2	LDRD Legal Authority and Order	A2
	Authorization Basis	
	DOE Orders Governing the LDRD Program	
Appendix 3	DOE Program Management and Oversight	A3
	Overview	
	Planning	
	Implementation	
	Reporting	
Appendix 4	Laboratory Program Management	A4
	Overview	
	Strategic Planning	
	Call for LDRD Proposals	
	Selection of Projects for Funding	
Appendix 5	Plant Directed Research, Development and Demonstration Program	A5
Appendix 6	Site Directed Research, Development and Demonstration Program	A6

FY 2004 LDRD Report to Congress

Executive Summary

The Laboratory Directed Research and Development (LDRD) program at the Department of Energy's (DOE's) multi-program National Laboratories, as well as analogous programs at the Department's Plants and at the Nevada Test Site, are Congressionally authorized programs designed to build capability to maintain the vitality of these nationally important institutions. This document fulfills all Congressionally directed LDRD program reporting requirements.

Overall, the multi-program National Laboratories included in this report devoted approximately \$365 million to LDRD, funding projects ranging in size from less than \$5,000 per year to over \$3 million, addressing topics that span the entire range of DOE's broad scientific mandate. An analysis of LDRD investments compared to the sources of laboratory funding indicates the LDRD benefits are commensurate with the funding received from defense, non-defense, and Department of Homeland Security (DHS) sources.

In response to the fiscal year (FY) 2002 Energy and Water Development Appropriations Conference Report, the Secretary issued guidance requiring all LDRD laboratories to notify other Federal agencies concerning LDRD charges. With the creation of the DHS, there are additional provisions for the notification of LDRD charges, as well as requirements for acknowledgements regarding the benefits of LDRD, prior to final approval of all DHS projects (see Section 2.3). Collectively these policies provide the basis for the Secretary's affirmation that all FY 2004 LDRD activities derived from funds of other Federal agencies have been conducted in a manner that supports the science and technology development that benefits the programs of the sponsoring agencies and is consistent with the appropriations acts providing funds to those agencies. That required affirmation is included as Appendix 1.

An important component of the LDRD program's contribution to the laboratories' future is its ability to attract promising young scientists and engineers to the institutions. LDRD-funded post-doctoral appointments, for example, supported 44 percent of all post-doctoral scientists and engineers at the reporting multi-program National Laboratories in FY 2004. In addition, many graduate students participate in LDRD projects, and the LDRD program provides a mechanism for scientists and engineers at the laboratories to keep themselves current in their fields.

The LDRD program is essential to maintaining the vitality of the laboratories that support the Department's missions and national needs. We have carefully reviewed the management and administrative procedures and funding levels at each of the laboratories and will continue to maintain a strong and vital LDRD program at the laboratories. In addition, the Department chartered a Core Team to review the LDRD program policy and guidance in an effort to provide necessary updates and ensure uniformity in interpretation. The team is finalizing its report and the resulting recommendations. Overall, the team feels the Departmental Order governing the LDRD program is effective but should be updated to reflect recent organizational changes and improvements in our management processes, as well as compliance with new reporting and oversight requirements stemming from reviews and Congressional direction.

FY 2004 LDRD Report to Congress

1. Introduction

1.1 Background

Pursuant to Congressional intent, the DOE multi-program National Laboratories and Manufacturing Plants, and the Nevada Test Site, operate research and development programs using a small portion of their overall budgets for the purpose of investing in critical future needs. This document reports on the programs for FY 2004.

LDRD, the first of these programs, was implemented at the DOE multi-program National Laboratories to formalize what had been a long-standing practice, authorized by legislation, to use portions of laboratory overhead for critical research and development efforts.

Within the overall context of maintaining the vitality of the laboratories, the specific purpose of the LDRD program is to provide the DOE laboratories with funds to undertake creative and innovative research and development activities in order to:

- (1) pursue new and innovative scientific and technological ideas;
- (2) enhance the scientific and technological vitality of the institution;
- (3) manage strategic direction; and
- (4) develop and retain new workforce capabilities.

DOE policy provides clear guidance to ensure effective management and oversight of the LDRD program while supporting the laboratories' abilities to pursue innovative projects. The process is consistent with DOE's management philosophy for all research and development activities, and it includes annual planning and reporting documents as well as program and peer reviews. The National Nuclear Security Administration, the Office of Science, and the Office of Nuclear Energy, Science and Technology serve as cognizant Secretarial officers for the multi-program National Laboratories.

1.2 Purpose of the Report

Formally, this report responds to the Conference Report (106-988) accompanying the Energy and Water Development Appropriations Act for FY 2001, which directed DOE's Chief Financial Officer "to develop and execute a financial accounting report of LDRD expenditures by laboratory and weapons production plant." It also responds to the Conference Report (107-258) accompanying the Energy and Water Development Appropriations Act for FY 2002 which directs the Secretary of Energy to include in the annual report to Congress for all LDRD

activities an affirmation that all LDRD activities derived from funds of other agencies have been conducted in a manner that supports science and technology development that benefits the programs of the sponsoring agencies and is consistent with the appropriation acts that provided funds to those agencies. Such an affirmation is included in Appendix 1 of this report.

Further, this report addresses Section 3136(b)(1) of the National Defense Authorization Act for FY 1997 (Public Law 104-201), which requires submission by February 1 of each year of “a report on the funds expended during the preceding fiscal year on activities under [the LDRD Program]...to permit an assessment of the extent to which such activities support the national security mission of the Department of Energy.” As defined in its current Strategic Plan, the Department’s national security mission is clearly and comprehensively supported by LDRD activities.

This report addresses how the LDRD program is managed, what research and development activities the funding supports, and why the program is important to DOE and the laboratories. The multi-program National Laboratories organize their respective programs according to their individual needs; however, the LDRD program does have a common administrative approach to Congressional and Departmental guidelines. This report speaks to those commonalities.

This report describes the LDRD program and its implementation at the various DOE multi-program National Laboratories. Newer, analogous programs implemented at the Nevada Test Site and at the manufacturing plants are discussed in detail in Appendices 5 and 6 of this report. They are authorized under separate legislation. The Plant Directed Research, Development and Demonstration (PDRD) program is consistent with Congressional intent as stated in the Energy and Water Development Appropriations Act for FY 2001 (Section 310) and the Defense Authorization Act for FY 2001 (Section 3165) to establish a Plant Directed Research, Development, and Demonstration program at the following sites:

- The Kansas City Plant, Kansas City, Missouri;
- The Y-12 Plant, Oak Ridge, Tennessee;
- The Pantex Plant, Amarillo, Texas; and
- The Savannah River Plant, Aiken, South Carolina.

The conference agreement allows for a maximum of 2 percent of the plants’ National Nuclear Security Administration (NNSA) operating budget to be utilized for the PDRD program.

The Site Directed Research, Development and Demonstration (SDRD) program is consistent with Congressional intent as stated in Section 310 of Energy and Water Development Appropriations Act for FY 2002 (H.R. 2311) which authorizes a program for directed research and development at the Nevada Test Site (NTS). The conference agreement allows for a maximum of 2 percent of NTS’s national security budget to be utilized for the SDRD program.

2. FY 2004 LDRD Program

2.1 Financial Information

2.1.1 LDRD Funding Mechanism

The LDRD program is structured to pursue innovative and creative science and technology, often with an emphasis on projects that will contribute to the needs of multiple programs and Federal agencies. The Department views LDRD as a legitimate cost of doing business for all sponsors at the multi-program laboratories. Therefore, to ensure that all users of the laboratories support their fair share of LDRD, the costs are funded as part of laboratory indirect costs, up to a maximum of 6 percent of operating and capital equipment costs, and are treated as normal costs of doing business. As such, all organizations that fund laboratory programs also fund LDRD activities. The capabilities developed and maintained through LDRD, in turn, benefit all laboratory customers. This combination of equitable treatment of laboratory sponsors and multiple benefits derived from LDRD is achievable only through the indirect cost funding mechanism for LDRD. The combination also underscores the value of the LDRD program to the laboratories and to the Nation.

The pricing policy of DOE is full cost, which includes all direct costs incurred in performing the work, allocable cost incurred in performing the work, allocable cost incurred by DOE and its contractors at any Departmental facility in performing work on behalf of non-DOE entities, and a Federal administrative charge of 3 percent of these costs. LDRD charges and assessments on Work for Others (WFO) agreements are discussed in more detail in Section 2.3. LDRD is considered an allocable cost in accordance with the terms of the laboratory operating contract and is identified in the laboratory's accounting system. Laboratory indirect costs are applied to all funds that come to the laboratories at rates reviewed by the Department. Exemptions from that assessment are uncommon, require the approval of Federal personnel and are reviewed annually. As a general policy, capital construction costs and major "pass-through" costs are exempt from a full indirect cost assessment, including LDRD.

2.1.2 FY 2004 Expenditures

For FY 2004 the multi-program National Laboratories devoted approximately \$365 million to LDRD. The following table shows the LDRD costs by site for FY 2004. For more details on the individual projects conducted at each site, see Note 1. Note 1 provides a project listing by site including project identifier, project name and total FY 2004 project costs. It should be noted that the following table includes all LDRD costs including individual project costs listed in Note 1 and any administrative costs not specifically assigned to individual FY 2004 projects, if applicable.

Table I. FY 2004 LDRD Costs by Laboratory

Laboratory	LDRD Costs (\$M)
ANL	24.9
BNL	7.2
INEEL	11.8
LANL	102.1
LBNL	12.0
LLNL	69.8
ORNL	15.3
PNNL	18.3
SNL	104.0

2.1.3 FY 2004 LDRD Allocation Percentages

Departmental policy states that the maximum funding level established for LDRD must not exceed 6 percent of the laboratory's total operating budget, including non-DOE funded work for the year, plus an amount of capital equipment not to exceed 6 percent of its total capital equipment budget for the year. It is important to note that individual LDRD program estimates at each site are approved based on laboratory estimated budgets for the fiscal year. Initial planning bases are derived from funds anticipated. The final percentage calculation is based upon actual LDRD costs and actual operating and capital equipment costs. Table II below includes the FY 2004 end-of-year information. It is important to note that "laboratory costs" are not the amount of laboratory program funding, but rather what was accumulated as costs. Also shown is the cost of work performed on behalf of other Federal agencies and non-Federal customers' WFO programs. LDRD charges and assessments on WFO agreements are discussed in more detail in Section 2.3.

Table II. Reported FY 2004 overall laboratory costs and LDRD costs at participating DOE laboratories.

Laboratory	Laboratory WFO Costs (\$M)	Total Laboratory Costs (\$M)	LDRD Costs (\$M)	LDRD Fraction
ANL	122.0	543.5	24.9	4.58%
BNL	85.6	440.7	7.2	1.63%
INEEL	152.8	796.0	11.8	1.48%
LANL	290.4	1859.1	102.1	5.49%
LBNL	111.7	482.2	12.0	2.49%
LLNL	323.8	1418.3	69.8	4.92%
ORNL	190.0	745.3	15.3	2.05%
PNNL	147.9	508.9	18.3	3.59%
SNL	603.9	1941.2	104.0	5.35%

In addition, an analysis of the FY 2004 LDRD program was conducted as it relates to funding received from both defense and non-defense sources (including DOE and WFO sponsors) and the return on the dollars invested by those sources in the LDRD program. This analysis now also includes data related to the DHS.

The total FY 2004 funding for the LDRD program conducted at the laboratories was approximately \$365 million, which represents about 4 percent of the total laboratory costs at these laboratories. Of this amount, \$228 million was provided by defense customers, \$126 million by non-defense customers, and \$11 million by DHS. A review of the LDRD program funding shows that about \$278 million supports projects that will be expected to benefit the defense and national security missions, \$306 million supports projects that will be expected to benefit non-defense customer mission areas, and \$102 million supports projects that will be expected to benefit DHS programs.

In assessing the return on the dollars invested in LDRD, it is essential to understand that the vast majority of research and development activities have application to national needs in defense, non-defense and DHS arenas. That is, as the numbers above indicate, many of the LDRD projects are put in more than one category since they support fundamental research and can be expected to benefit defense, non-defense and DHS missions. The clear implication is that the anticipated benefit of LDRD science and technology to defense, non-defense and DHS national needs will always exceed the relative contribution of funds from these sources independently. This leveraging of the research capabilities of the DOE's multi-program laboratories is one of the great benefits of the LDRD program and its focus on the long-term vitality of the laboratories.

2.2 Workforce Development

Maintaining the vitality of the DOE multi-program National Laboratories—the overarching theme of the LDRD program—implies a responsibility not only for future-looking research and development but also for the workforce of the future. For the laboratories to be poised to tackle problems confronting DOE and the Nation it requires more than facilities and infrastructure. Scientists and engineers must also be available to implement the capabilities of the laboratories.

Post-doctoral appointments offer the single largest source of new scientific and engineering talent for the DOE laboratories and are therefore critical to maintaining institutional vitality. The LDRD program plays a central role in the various post-doctoral programs at all of the laboratories, as shown in Table III.

Table III. Postdocs supported by LDRD at the DOE Laboratories in FY 2004.

Laboratory	Total postdocs	Postdocs supported by LDRD	LDRD-supported fraction
ANL	229	60	26%
BNL	119	47	39%
INEEL	19	2	11%
LANL	508	314	62%
LBNL	297	55	19%
LLNL	147	125	85%
ORNL	176	56	32%
PNNL	113	32	28%
SNL	145	80	55%

In addition to this formal participation in post-doctoral programs, the LDRD program also supports a wide range of activities that enhance the laboratories workforce development. These include support for both undergraduate and graduate students working on LDRD projects, reputation building by providing laboratory visibility in a wider range of publication venues than would be the case without the results of LDRD, technical staff retention associated with opportunities to retain and hone scientific skills via LDRD, and a remarkable range of university collaborations stimulated via LDRD projects.

2.3 LDRD and the Work for Others Program

One of the major benefits the Nation derives from the DOE multi-program National Laboratories is the synergistic application of science and technology to a broad range of critical national security and science missions, through the DOE WFO program.

As mentioned above, the LDRD program is structured to pursue innovative and creative science and technology, often with an emphasis on projects that will contribute to the needs of multiple programs and Federal agencies. All WFO sponsors benefit from the strong science and technology base enhanced by LDRD. The Department views LDRD as a legitimate cost of doing business for all programs at the multi-program laboratories. Therefore, to ensure that all users of the laboratories support their fair share of LDRD innovations, the cost is included as an allocable cost.

WFO programs are possible because the laboratories have developed unique research and development capabilities in a wide range of areas of relevance to organizations besides DOE. WFO customers seek out these capabilities and, in many cases, initiate WFO research and development at the laboratories. WFO research broadens the base of innovation at the DOE laboratories and increases the number of potential solutions to national challenges, including threats to national security. The laboratories' research results are enhanced by the cross-pollination of technologies developed in conjunction with its WFO partners.

In this regard, Congress provided language in the Conference Report accompanying the FY 2002 Energy and Water Development Appropriations Act that requires the Department to notify other Federal agencies that a portion of the funds collected through the WFO program will be used to fund LDRD projects. In addition, with the creation of the DHS, Congress enacted analogous requirements that LDRD funding associated with DHS programs be used to support DHS missions. As noted earlier, the Conference Report also requires the Secretary to affirm that all LDRD activities derived from funds of other agencies have been conducted in a manner that supports science and technology development that benefits the programs of the sponsoring agencies and is consistent with the appropriation acts that provided funds to those agencies.

In response to the FY 2002 Conference Report, the Secretary issued guidance requiring all LDRD laboratories to notify other Federal agencies concerning LDRD charges. These procedures changed the WFO process to ensure proper notification of other Federal agencies as to the LDRD charges prior to funding work at the laboratory. Specifically, each new and/or revised WFO proposal provided to a Federal agency must indicate the amount of LDRD charges that will be collected. Furthermore, the proposal notifies the sponsor that, by providing funding, the agency is acknowledging that LDRD activities are beneficial to their organization and consistent with appropriation acts providing funds to that agency. Subsequently, each WFO funding acceptance document also includes the LDRD estimate acknowledgement.

In February of 2003, the Secretary of Energy and the Secretary of Homeland Security entered into a Memorandum of Agreement to implement key provisions of the Homeland Security Act. In addition, the Deputy Secretary of Energy issued a DOE Notice on *Reimbursable Work for the Department of Homeland Security*. The purpose of that document was to provide information on the process by which the DHS may place orders for reimbursable work activities to be performed at the DOE laboratories. Within that Notice, there are provisions for the notification of LDRD charges in the cost proposal as well as requirements for acknowledgements regarding the benefits of LDRD prior to final approval.

These policies have been implemented and provide a basis for the Secretary to affirm that the LDRD program is managed in accordance with the Congressional direction cited above. The Secretarial affirmation is included as Appendix 1. In December of 2003, the DOE Acting Chief Financial Officer transmitted applicable guidance and policy to reiterate the process to other Federal agency Chief Financial Officers who are customers and sponsors of work at the Department's laboratories.

3. Report Conclusions

The DOE LDRD program offers a crucial mechanism by which the multi-program National Laboratories maintain their vitality and, in the process, prepare themselves to meet the Nation's future scientific and engineering challenges. In FY 2004, the multi-program National Laboratories devoted approximately \$365 million to LDRD, funding projects ranging in size from less than \$5,000 per year to over \$3 million. LDRD projects address topics that span the entire range of DOE's broad scientific mandate. An analysis of LDRD investments compared to the sources of laboratory funding indicates the LDRD benefits are commensurate with the funding received from defense, non-defense and DHS sources. In addition, the Department affirms that all FY 2004 LDRD activities derived from funds of other Federal agencies have been conducted in a manner that supports science and technology development that benefits the programs of the sponsoring agencies and is consistent with the appropriations acts providing funds to those agencies.

An important component of the contribution of the program to the laboratories' future is their ability to attract promising young scientists and engineers to the institutions. LDRD funded post-doctoral appointments, for example, supported 44 percent of all post-doctoral scientists and engineers at the multi-program National Laboratories in FY 2004. In addition, many graduate students participate in LDRD projects, and the programs provide a mechanism for scientists and engineers at the laboratories to keep themselves current in their fields.

The LDRD program is essential to maintaining the vitality of the laboratories that support the Department's missions and national needs. We have carefully reviewed the management and administrative procedures and funding levels at each of the laboratories and will continue to maintain a strong and vital LDRD program at the laboratories.

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ANL - Argonne National Lab

Project ID	Project Name	FY Total
P/ANL2002-001	Laser-Based Ignition System for Natural Gas Reciprocating Engines	\$166600
P/ANL2002-017	Magnetically Stabilized Metal Clusters	\$25300
P/ANL2002-018	New Photonic Materials Based on the Self-Assembly of Nano-Structured Metallo-Organic Building Blocks	\$137900
P/ANL2002-099	Advanced Biological Sensors Based on Fluorescent Conjugated Polymers	\$90000
P/ANL2002-147	A Calorimeter for the Linear Collider Detector	\$75300
P/ANL2002-149	Derivatization of Ultrananocrystalline Diamond for Bioassays	\$80600
P/ANL2002-152	Petascale Experimental Research	\$1305100
P/ANL2002-153	Prokaryotic Simulation System: Computational Biology and Bioinformatics -- the Science Drivers for PXRF	\$1258200
P/ANL2002-154	Computational Science for Self-Assembly	\$102900
P/ANL2002-161	Environmental Decision Making Technology R&D	\$110000
P/ANL2002-163	Capabilities Development for the Analysis of Complex Adaptive Systems	\$224300
P/ANL2002-185	Bio-Nano Composite Structures	\$200200
P/ANL2002-186	Nanophotonics	\$200800
P/ANL2002-187	Quantum Materials	\$199100
P/ANL2002-188	Adaptive Nanoscale Self-Assembly	\$271200
P/ANL2002-192	Development of Nanofabrication Techniques using Advanced Lithography	\$126000
P/ANL2002-194	Surface Spin Polarization for Spintronics	\$77300
P/ANL2002-195	Catalytic Destruction of Chemical Threats in Human Occupied Spaces	\$50000
P/ANL2002-196	Hybrid and Patterned Nanomagnetic Systems	\$298800
P/ANL2002-199	Nanoscale Multiferroics for Coupled Magnetic and Ferroelectric Functionality	\$76400
P/ANL2002-200	Nanoscience and Biomineralization	\$51200
P/ANL2002-201	Synthesis and Physical Properties of Functionalized Diblock Copolymers and Magnetic Nanocrystal Arrays (new title)	\$77100
P/ANL2002-202	UHV STM for Self-Assembled Magnetic Nanowires	\$49000
P/ANL2002-203	Fabrication of Nanowires with Anodized Aluminum Oxide	\$50100
P/ANL2002-204	Imaging of Nanoscale Vortex States in Superconductors by Scanning Tunneling Spectroscopy	\$49500
P/ANL2002-205	Surface Functionalization of Ultrananocrystalline Diamond Thin Films	\$75700
P/ANL2002-206	Counter Terrorism Application of Agent Based Simulation	\$79500

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ANL - Argonne National Lab

Project ID	Project Name	FY Total
P/ANL2002-211	Interacting Laterally Patterned Magnetic Structures	\$199400
P/ANL2002-212	Thermal Transport in Nanostructures and Nanocomposites	\$25600
P/ANL2002-213	Self-Assembly and Self-Organization of Nanostructures by Multiscale Materials Simulation	\$75300
P/ANL2003-010	Preparation and Crystallization of Membrane Proteins, MerC and MerT Involved in Bacterial Mercuric Ion Detoxification	\$84000
P/ANL2003-040	Vortex Cellular Automata: Computing with Superconducting Vortices in Nanoscale Devices	\$86400
P/ANL2003-064	Bio/Inorganic Hybrid Arrays for Photovoltaic Cells and Biological Sensors	\$139700
P/ANL2003-073	The Control of Shape, Size, and Reactivity of Metal Oxide Nanoparticles	\$126500
P/ANL2003-080	Laser Trapping and Cooling of Radium-225	\$84500
P/ANL2003-087	Development of Surface Treatments for Ultra High Gradient Accelerator Cavities	\$134700
P/ANL2003-103	Fluxoid Manipulation by Josephson Vortices: New Opportunity for Vortex Logic	\$86500
P/ANL2003-105	Ultrafast Spectroscopy, Combining Lasers and X-Rays	\$138900
P/ANL2003-106	Metabolome Analysis from Aptamer Biochips	\$146200
P/ANL2003-117	Quantized Magneto-Catalysis of Electron Transfer Reactions	\$90200
P/ANL2003-119	Tunable Terahertz Sources	\$146700
P/ANL2003-124	Development of Polysiloxane-Based Solid Electrolytes for Lithium Batteries	\$135200
P/ANL2003-128	Novel Thin-Film Diamond Electronics	\$96900
P/ANL2003-146	Synthesis of High Temperature Superconductor Wires using Novel Atomic Layer Deposition Synthesis	\$147600
P/ANL2003-151	Time-Resolved X-Tomography of Highly Transient Fuel Sprays	\$134300
P/ANL2003-158	High-Sensitivity Infrared Imagers for Environmental and Energy Security/Safety Monitoring	\$129600
P/ANL2003-172	Mass Spectral Detection of Biomolecular Interactions on a Functional Proteomic Biochip	\$192800
P/ANL2003-173	Functional Genomics of Endothelial Cell Tube Formation	\$273300
P/ANL2003-176	Designer Antibodies and Interaction Mapping	\$715700
P/ANL2003-177	Nano-Architecture from the Bio-System: Fabrication, Assembly and Function	\$184200
P/ANL2003-185	High-Power Beam Dump for a Large Acceptance RIA Fragment Separator	\$525900

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ANL - Argonne National Lab

Project ID	Project Name	FY Total
P/ANL2003-188	Development of a Model 3-Spoke Superconducting Resonator for RIA	\$720100
P/ANL2003-204	Lightweight and Robust Hydrogen Storage Materials for Automotive Fuel Cells	\$160300
P/ANL2003-216	Linear Collider R&D: High Gradient Accelerating Structures	\$283500
P/ANL2003-217	High-Brightness Beams Electron Sources	\$143200
P/ANL2003-218	Damping Rings for Linear Colliders	\$26800
P/ANL2003-219	Investigations of the Effect of the Biogeochemical Cycling of Iron on the Fate and Transport of Heavy Metal, Radionuclide, and Organic Contaminants	\$420800
P/ANL2003-224	Separative Bioreactor Model: Using pH-Controlled Electrodeionization	\$87300
P/ANL2003-230	Demonstrate the Two-Charge State Injector Concept for the RIA Driver Linac	\$300500
P/ANL2003-237	Study of Beam Halo Formation in Longitudinal Phase Space in the RIA Driver Linac	\$206500
P/ANL2003-242	Transmission Multilayer Optics for Sub-Ten-Nanometer Focusing of Hard X-Rays	\$175600
P/ANL2003-256	Vacuum-Ultraviolet Free-Electron Laser Studies	\$250800
P/ANL2003-288	Thin-Film Liquid Lithium Stripper for the RIA Driver Linac	\$700800
P/ANL2003-329	Hydrogen Production from Low Temperature Thermochemical Cycles Compatible with Heat from a Na-Cooled Nuclear Reactor	\$230100
P/ANL2003-331	Process and Equipment Integration for a Recycling Capability	\$225500
P/ANL2003-332	Integration of Automated Systems and Robotics for a Recycling Operation	\$69800
P/ANL2003-335	Experimental Testing of Pyroprocessing Structural Materials	\$206200
P/ANL2003-336	Multidisciplinary Theory	\$297600
P/ANL2003-337	The Use of Synchrotron Radiation Sources for Homeland Security	\$99600
P/ANL2003-338	Modeling Near-Field Atmospheric Dispersion and the Potential Health and Economic Impacts from Terrorism Scenarios Involving "Dirty Bombs" or Similar Devices	\$134400
P/ANL2003-340	Core-Shell Nanocrystal Spring Magnets	\$80100
P/ANL2003-341	Simulation and Modeling of Reactivity in Nanoporous Materials	\$73500
P/ANL2004-002	Development of Germanium Double Sided Strip Detectors for Nuclear Imaging Applications	\$122900
P/ANL2004-009	Ultrafast Laser/X-Ray Interactions	\$75000
P/ANL2004-014	Development of Cross-Polarization Confocal Microscopy for Measurement of Subsurface Microstructure	\$106100

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ANL - Argonne National Lab

Project ID	Project Name	FY Total
P/ANL2004-018	Fundamental and Applied Studies of Novel Intermetallic Thin Films for Lithium Ion Battery Anodes	\$150200
P/ANL2004-019	Multiphase CFD Analysis of Vascular Lesion Formation	\$146700
P/ANL2004-026	Science and Technology of a New TiAlOx Alloy Oxide and TiO2/Al2O3 Superlattice Oxide Layers and Their Application to a New Generation of Integrated Circuit Gate Dielectric	\$94700
P/ANL2004-036	Direct Conversion of Sequestered CO2 to Feedstocks for Large Commodity Chemicals	\$52000
P/ANL2004-038	Time-Resolved Studies of Magnetization Dynamics in Nanostructured Materials	\$109700
P/ANL2004-041	Site-Specific Magnetism in Crystals	\$110100
P/ANL2004-044	Palladium/Semiconductor Nanohybrids as Hydrogen Sensors for Fuel Cell Applications	\$149400
P/ANL2004-046	Superconducting Magnetic Control System for Manipulation of Magnetic Particles and Nano-Particles for Medical Applications	\$149000
P/ANL2004-057	Novel Integrated (On-Chip) Magnetic Field Sensors	\$69600
P/ANL2004-063	Ferromagnetic Micro-Disks with Superior Properties for Biomedical Applications	\$119400
P/ANL2004-069	Design and Fabrication of Two Novel High-Gradient Accelerating Structures: The Metallic Photonic Bandgap Accelerator and the SiC Surface Wave Accelerator	\$95000
P/ANL2004-086	A New Low Temperature Thermochemical Hydrogen Production Cycle Based on Heavy Element Halides	\$105700
P/ANL2004-095	Nanoporous Separation Membranes	\$172700
P/ANL2004-103	Direct Regeneration of Cofactors with an Electron/Ion Mixed Conductive Matrix	\$128500
P/ANL2004-115	Photosynthetic Reaction Center as a Novel Quantum Electronic Circuit Element	\$148500
P/ANL2004-126	Novel Hydrogen Storage Media through Nano-Structured Polymer and Carbon Layer Materials	\$135100
P/ANL2004-127	Hydrogen Storage through Organic Hydride	\$118000
P/ANL2004-133	Ultra-High-Sensitive Miniature Calorimeter for Studies of Confinement Effects of Bio-Organic Structures	\$129800
P/ANL2004-141	Environment for a Nanoscale Materials Virtual Fab Lab	\$138300
P/ANL2004-142	Simulations of Spin Wave Excitations in Magnetic Nanoparticles	\$64800

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ANL - Argonne National Lab

Project ID	Project Name	FY Total
P/ANL2004-143	Hydrogen Storage using Novel Nanoporous Materials Coated via Atomic Layer Deposition	\$64900
P/ANL2004-144	Near-Field Optical Investigations of Nanoscale Photochemistry and Photophysics	\$176300
P/ANL2004-145	Ultrasensitive Hydrogen Sensors	\$138200
P/ANL2004-147	Large Scale Manufacturing of Hydrogen in Gas-Fluidized Bed Reactors with Nanostructured Support Catalysts and Modulated Air Flow	\$80000
P/ANL2004-148	Discovery of Protein Space	\$80100
P/ANL2004-149	Nano IR Spectroscopy and Imaging	\$103600
P/ANL2004-150	Aerosol Characterization and Modeling: Morphology and Surface Reactions	\$74200
P/ANL2004-152	Fundamental Aspects of Hydrogen Storage in Novel Nanocomposite Materials	\$93900
P/ANL2004-154	Nanoscale Confinement of Highly Spin-Polarized Oxides	\$49800
P/ANL2004-156	Functional Metalloproteomics	\$149900
P/ANL2004-157	High-Throughput Analysis of Low Abundance Protein Constituents in Complex Biological Mixtures	\$566100
P/ANL2004-158	Development of Peptide Biochips for a Whole-Proteome Analysis of Protein Interactions with Peptide Recognition Modules	\$243900
P/ANL2004-159	Molecular Recognition: Protein-Small Molecule Interactions	\$79500
P/ANL2004-160	Characterizing and Unveiling the Mechanism of Protein-Ligand Interactions	\$199200
P/ANL2004-161	Evolution of the Hydrogen Infrastructure as a Complex Adaptive System	\$144900
P/ANL2004-162	The Biogeochemical Cycle of Nitrogen: Effects on Climate Change	\$70600
P/ANL2004-164	Challenge and Opportunity in Megaproteins	\$194600
P/ANL2004-165	Core Physics Conceptualization of an Inert Matrix Fuel Assembly	\$90100
P/ANL2004-166	Inert Metal Matrix LWR Dispersion Fuel Fabrication	\$196600
P/ANL2004-167	Evaluation of Fuel-Cladding Interaction in a Lined, ODS-Clad, SFR Fuel for Hydrogen Production Applications	\$68700
P/ANL2004-169	Compact Heat Exchanger Studies for Supercritical CO ₂ Power Conversion System	\$175400
P/ANL2004-173	Modeling Nuclear Energy Market Penetration in the U.S. Energy Sector	\$120800
P/ANL2004-174	Life Cycle Analysis for the DANESS System Dynamics Code	\$89900
P/ANL2004-175	Economic Impacts of a Transmutation Enterprise	\$125600
P/ANL2004-177	Recovering Actinides from UO ₂ -Carbide Fuels	\$49100

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ANL - Argonne National Lab

Project ID	Project Name	FY Total
P/ANL2004-178	Incorporating Advanced Methods and Instrumentation into an Analytical Chemistry Laboratory to Support Advanced Fuel Cycle Needs	\$45800
P/ANL2004-179	ICP-OES and ICP-MS Methods for Actinide Accountancy Measurements and Process Control in Spent Fuel Processing	\$54900
P/ANL2004-180	AMUSE Development, Beyond Solvent Extraction and Into Hybrid Processing	\$175900
P/ANL2004-181	Evaluation and Development of a Supercritical Carbon Dioxide Based Dry Processing Technology and Related Closed Fuel Cycle Applications	\$50000
P/ANL2004-182	High Strength and Heat Resistant Chromium Steels - Promising Structural Materials for Sodium-Cooled Fast-Reactor Heat Exchangers	\$83000
P/ANL2004-185	Investigation of Passive Safety Performance of the Very High Temperature Reactor (VHTR) in Hydrogen Production Applications	\$100000
P/ANL2004-186	Design of a Helium Loop with Controlled Impurity Control for Research on Materials with Application in VHTR	\$29900
P/ANL2004-187	Passive Decay Heat Removal in the Very High Temperature Reactor	\$100000
P/ANL2004-188	Development of Advanced Computational Procedure for VHTR Physics Analyses	\$200000
P/ANL2004-191	Multidimensional Flow and Heat Transport Natural Convection Test Capability	\$100000
P/ANL2004-194	Hydrogen and Oxygen Production from Low Temperature Hybrid Cycles	\$142800
P/ANL2004-195	Single Step Hydrogen Production from Water using Catalytic Dense Mixed-Conducting Membranes	\$77100
P/ANL2004-198	The Electrochemical Storage of Hydrogen in a Zintl Matrix	\$76500
P/ANL2004-201	Microfluidic Study of Nanofluids	\$76600
P/ANL2004-202	Integrating Sensor Networks and Radiation Detectors to Protect Urban Areas from Radiological Terrorism	\$179800
P/ANL2004-212	Novel Superhard Coatings for Wear Reduction and Energy Saving Applications in Diesel Engines	\$114300
P/ANL2004-213	Pressure Rate Controlled Compression Ignition Engine	\$159100
P/ANL2004-214	Homogeneous Charge Compression Ignition (HCCI) Engine Research: An Advanced Concept for IC Engines	\$91600
P/ANL2004-215	Investigation into Nano-Particulate Production from Homogeneous Charge Compression Ignition (HCCI) Combustion	\$154800
P/ANL2004-216	Optimization of Electromagnetic Pumps for Liquid Lithium Applications	\$100000
P/ANL2004-221	T Lymphocyte Differentiation of Human Blood Progenitor Cells	\$276700

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ANL - Argonne National Lab

Project ID	Project Name	FY Total
P/ANL2004-222	RF Capture Studies Using a Second Harmonic System on the IPNS Rapid Cycling Synchrotron (RCS)	\$61200
P/ANL2004-224	Improvement of High-Voltage Breakdown Characteristics in Linacs by Atomic-Scale Surface Smoothing Techniques	\$63000
P/ANL2004-225	EPICS on Emerging Computer Platforms	\$34700
P/ANL2004-226	Development of Ultrafast Laser Techniques for Advanced Accelerator Research	\$129000
P/ANL2004-227	Advanced Heavy-Ion Beam Dynamics	\$90200
P/ANL2004-228	Next-Generation Light-Source Storage Ring Design and Simulation	\$45000
P/ANL2004-229	Improvement of FNAL Run II Performance: Booster Beam Dynamics	\$39200
P/ANL2004-231	Improvement of FNAL Run II Performance: Tevatron Optics Modeling	\$29000
P/ANL2004-232	Improvement of FNAL Run II Performance: Optical Transition Radiation (OTR) Imaging for Protons and Antiprotons	\$18100
P/ANL2004-233	Improvement of FNAL Run II Performance: Electron Cooling	\$81200
P/ANL2004-234	RF Superconductivity for Future Accelerators	\$232200
P/ANL2004-236	SANS with Polarized Neutrons as a Tool for Studying Nanomagnetism in Nanostructured Materials	\$49000
P/ANL2004-238	Quantum Computation with Electron Spins: Qubit Networks of Endohedral N in C60	\$79700
P/ANL2004-239	Evaluation of Fast Flux Test Facility	\$162600
P/ANL2004-240	Proteomic and Phage-Display Analysis of Mitochondrial Compartmental Oxidant Biosensors for the Study and Reversal of Sudden Death Events	\$96000
P/ANL2004-241	A New Approach to Recycling Spent Nuclear Fuel: Hybrid Solvent Extraction-Electrorefining	\$181800
P/ANL2004-242	Laser Surface Texturing for Friction Reduction	\$218400
P/ANL2004-243	Innovations for Small Modular Fast Reactor	\$256300
Total # of Projects for ANL:	159	Total Cost for ANL: \$24873700

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

BNL - Brookhaven National Lab

Project ID	Project Name	FY Total
02-002	Crystallization and X-ray Analysis of Membrane Proteins	\$410554
02-008	Creating a MicroMRI Facility for Research and Development	\$178948
02-009	Targeting Tin-117m to Estrogen Receptors for Breast Cancer Therapy	\$49009
02-022	Electrical Systems Reliability	\$103512
02-045	Combined Use of Radiotracers and Positron Emission Imaging in Understanding the Integrated Response of Plants to Environmental Stress	\$149232
02-070	Theory of Electronic Transport in Nanostructures and Low-Dimensional Systems	\$148483
02-071	Pressure in Nanopores	\$57423
02-084a	Genomic Selex to study Protein DNA/RNA Interactions in Ralstonia metallidurans CH34 Regulating Heavy Metal Homeostasis and Resistance	\$161662
02-084b	Lead Resistance in Ralstonia metallidurans CH34	\$169708
02-086	Ultrafast X-Ray Science	\$104578
02-088	X-Ray Photon Correlation Spectroscopy Studies of Nanostructured Block Copolymers	\$104775
03-004	High-Brightness, High-Power Electron Beams	\$192464
03-006	Feasibility Study of Optical Stochastic Cooling with a CO2 Laser	\$121834
03-013	Proposal for Niobium/Tin Superconducting Magnet	\$156269
03-014	Technology Development for Linear Collider Final Focus Quadrupoles with Small-Aperture High-Gradient Superconducting Coils	\$129829
03-026	Developing a New, Unified Systems Theory on Size Distributions of Atmospheric Particles	\$45447
03-027	Measurement of HO2 Radicals by ChemiLuminescence Analysis of Atmospheric Radicals (CLAAR)	\$99045
03-030	Chemistry of the Rhizosphere	\$101573
03-039	Integrated Analysis of Carbon and Nitrogen Metabolism in Plants and Subsequent Analysis of Photosynthetic Acclimation to Growth in Elevated pCO2	\$67283
03-050	Evaluation of High-Energy Radiation Effects in Materials	\$105354
03-056	Structural Properties of Methane Hydrates	\$103647
03-061	Dynamics of Wind Turbine-Tower-Foundation Systems	\$145957
03-064	Investigation of Neutron and Gamma Probes to Detect Explosives in Sealed Containers	\$112370

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

BNL - Brookhaven National Lab

Project ID	Project Name	FY Total
03-065	Ultrasound and Infrared Imaging to Detect Degradation of Electric Cable Insulation	\$74604
03-072	Application of Compton-Suppression Gamma-Ray Spectrometry to Counterterrorism Problems	\$134174
03-077	Real-Time Consequence Assessment System for Atmospheric Terrorist Events in the Northeast Urban Corridor	\$72951
03-081	Application of Thin Film-Like Dosimeters for Port Security and Anti-Terrorism	\$100696
03-083	Novel Xenon Detector Concepts for Homeland Defense	\$103976
03-086	Defining New Pathways for Disarming Anthrax Toxin	\$99543
03-094	Structural Studies on the Integral Membrane Protein AlkB	\$96692
03-098	Roles of Dopamine Receptor Agonists in Brain Metastasis of Breast Cancer	\$99091
03-099	The microPET Study of Gene Expression in Rodents	\$94700
03-100	Investigation of the "Early Response" in Functional MRI	\$123500
03-101	PET Imaging of Violent Behavior	\$98978
03-103	PET Study of Acetaldehyde Distribution and Metabolism to Better Understand Alcohol Related Diseases	\$98889
03-104	Hydrogen Atom Transfer from Carbon to Metal - Relevance of a Novel Reaction to Catalyzed Hydrocarbon Conversions	\$56480
03-105	Radioprotection in D. Radiodurans, a Radiation Resistant Bacterium	\$74668
03-107	New Development of Norepinephrine Transporter Radioligands for PET Studies of Substance Abuse, Depression and ADHD	\$111095
03-108	Experiments in the Short-Wavelength Regime Pertinent to the DUV-FEL Concept	\$131367
03-115	Imaging Tandem Mass Spectrometry for High-Throughput "Fingerprint" Detection of Complex Molecules in Mixtures	\$109593
03-118	Condition: Green Chemistry Radiolytic Studies of Ionic Liquids in Service of Security and the Environment	\$79517
03-119	Exploring the Use of Powder Diffraction for Proteins	\$79445
03-121	Element-Resolved Dynamics of Nanoscale Ferromagnets	\$79558
03-122	Membrane Biophysics Using Model Membranes	\$79316
03-127	High Pressure in Strongly Correlated Materials - An Optical Investigation	\$66865
03-129	Polyoxometalate Giant Molecules: Novel Synthetic Methods, Characterizations and Potential Applications	\$95532

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

BNL - Brookhaven National Lab

Project ID	Project Name	FY Total
03-135	Exploratory Sol-Gel Synthesis	\$81047
03-137	In Situ Soft X-Ray Absorption Spectroscopy Studies of Cathode Materials for Thin Film Lithium-Ion Batteries	\$46337
03-138	Functional Bulk Mn-Based Nanocomposites	\$76906
03-144	Nanostructured Transition Metal Oxides	\$76347
03-151	Radio Wave Detection of Ultra High Energy Cosmic Rays	\$123923
03-161	Generation of Coherent, Femtosecond, High Brightness VUV and X-Ray Beams Using High Order Harmonic Conversion	\$139719
03-162	New Synthesis Techniques to Control Atomic Defects in Advanced Intermetallic Compunds	\$90577
04-011	Femtosecond Photoinitiated Nanoparticle Surface Chemistry	\$79532
04-013	Chirped Pulse Amplification at the DUV-FEL	\$78404
04-025	Overcoming Coherent Instabilities at Medium-Energy Storage Rings	\$91415
04-033	Layered Cobaltates with High Thermoelectric Power	\$61780
04-038	Complex Thin Films and Nanomaterial Properties	\$79
04-041	Physics of Quark Gluon Plasma (QGP)	\$69272
04-043	Very Long Baseline Neutrino Oscillation Experiment	\$71099
04-046	Advanced ³ He Detectors for the Spallation Neutron Source	\$72953
04-055	Genetic NanoTags	\$12933
04-060	The Use of Singular Point Genome Sequence Tags to Analyze Community Composition and Metabolic Potential	\$121236
04-061	3-D Electronic Wave Functions from EM Images	\$98945
04-062	Functional MRI Studies in Rats using Implanted Brain Electrodes	\$78466
04-063	Optimizing Functional Neuroimaging Techniques to Study Brain Function in Health and Disease States	\$100684
04-066	Technological Development of a Fluorescence Probe for Optical Detection of Brain Functional Activation in vivo	\$27032
04-069	Nuclear Control Room Unfiltered Air In-Leakage by Atmospheric Tracer Depletion (ATD)	\$59463
04-073	Perfluorocarbon Tracer Sampling, Tagging and Monitoring Techniques for use at the Urban Atmospheric Observatory	\$65530
04-079	Development of an Aerosol Mobility Size Spectrometer and an Aerosol Hygroscopicity Spectrometer	\$65589

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

BNL - Brookhaven National Lab

Project ID	Project Name	FY Total
04-086	Exploration of Thermal Diffusion Processes in CdZnTe for Improved Nuclear Radiation Detectors	\$86077
04-088	An Integrated Approach of High Power Target concept Validation for Accelerator-Driven Systems	\$82747
04-104	Hydrogen Storage Using Complex Metal Hydrides for Fuel Cell Vehicles	\$70265
Total # of Projects for BNL:	73	Total Cost for BNL: \$7208543

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

INEEL - Idaho National Engineering and Environmental Lab

Project ID	Project Name	FY Total
AC101	Parallel Computing with Cluster Technology	\$155394
AC104	Development and Validation of Advanced Simulation and Collaboration Capability	\$73349
AE100	An Innovative Gas-Cooled Fast Reactor	\$411436
AE101	Advanced Fission Product Detection Systems for the Next Generation Nuclear Reactors	\$230281
AE102	Development of Advanced Aqueous Processing to Support the Nuclear Fuel Cycle	\$174590
AE103	Radiation Chemistry of Supercritical Water	\$207812
AE104	Development of Experimental Methods for Measurements of Nuclear Cross Sections	\$478362
AE105	Evaluation of Alternate Materials for Coated Particle Fuels for the Generation IV Gas-cooled Fast Reactor	\$294010
AE106	Fast Test Irradiation Facility	\$199996
AE107	Investigation of Fundamental Thermal-Hydraulic Phenomena in Advanced Gas-Cooled Reactors	\$298257
CS117	Development of a Compact Laser-Compton X-ray Source	\$108249
CS118	Advanced Automated Ion Mobility Spectrometer for Explosives Detection	\$222304
CS119	First Responder and DOE Site Recon UAV Capability	\$243464
CS120	Transmission Line Security Monitor and Repeater System Concept	\$153851
CS121	Software Tool-kit for Effective and Repeatable Remote Attacks Against Command and Control Systems used in Electricity Generation and Distribution	\$98708
CS122	TEstbed for Personal Electronic Devices (TEPED)	\$96954
ET116	Advanced Control Architectures for Human-Robot Synergy in Complex, Multi-Operation Domains	\$134918
ET118	Intelligent Control of Multi Nodal Systems	\$84972
ET121	Human Factors for Management of High Consequence Events	\$126285
ET122	Developing the Scientific Basis for Landscape Level Management of Federal Facilities	\$134853
ET123	Genetic Control of Straw Stem Ultrastructure that Affects the Biomechanics of Stem Separation.	\$59913
ET124	Development of Analytical Decision-Making Tools for Energy Efficient Agricultural Biomass Production	\$94878

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

INEEL - Idaho National Engineering and Environmental Lab

Project ID	Project Name	FY Total
ET125	Stable Enzymes for Hemicellulose Hydrolysis	\$74618
ET126	Pretreatment Technologies for Cellulosic Biomass	\$84991
ET127	Flow Characterization of Complex Biomass Flows for Bioenergy Feedstock Development	\$84906
ET128	Co-Firing of Coal and Refuse-Derived Fuel with Oil Shale for Control of Environmental Contaminants and Improved Energy Production: Laboratory Studies	\$85031
ET129	Highly Selective Sorbents for Removal of Arsenic from Drinking Water	\$85227
ET130	Investigation and Modeling of Dynamic Strain Rate Effects on Structural Material Response	\$84980
ET131	Novel Abrasion Resistant, Enhanced Flux Ultrafiltration Membranes	\$74738
GC135	Investigation of the Movement and Fate of Chlorinated Hydrocarbons	\$229543
GC136	Modeling of Flow and Colloid Behavior in Subsurface Fractures	\$260560
GC141	Calibration and Enhancement of Geophysical Imaging Tools in a Mesoscale Experimental Facility	\$259702
GC150	Multiscale Modeling of Multiphase (Unsaturated) Flow	\$86551
GC151	Modeling Solute Partitioning at Interfaces	\$85104
GC152	Estimating the Climatic Sensitivity of Vadose Zone Infiltration Rates through Paleohydrologic Analyses	\$33261
GC153	Development and Use of Transgenic <i>Caenorhabditis elegans</i> to Measure Bioavailability of Metals and Mutagenicity in Contaminated Media	\$105672
GC154	Experimental Stochastic Analysis of Unsaturated Flow using a Geocentrifuge	\$161109
GC155	Use of Genetic Markers as a Screening Tool for Ecological Risk Assessment - White Paper	\$4307
GC156	Manipulation of Flow in Subsurface Environments ? Coupling between Precipitation and Fluid/Mass Transport	\$400978
GC157	Stratigraphic Characterization of the Eastern Snake River Plain Aquifer using Geochemical and Paleomagnetic Analysis of INEEL Basalt Core	\$19980
HT100	Hydrogen Production from High Temperature Nuclear Reactors	\$470513
HT101	Polybenzimidazole-Based Composites as Candidate Materials for Hydrogen Containment and Purification	\$137227
HT102	Influence of surface properties on hydrogen effects in pipeline materials	\$116668
HT103	Hydrogen Delivery and Thermal Separation in Natural Gas Pipelines	\$128294

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

INEEL - Idaho National Engineering and Environmental Lab

Project ID	Project Name	FY Total
NE130	An Improved Approach for Measuring Thermal Conductivity	\$186437
NE131	Bimodal Nuclear Thermal Propulsion	\$172294
NS134	Enhanced Isotope Ratio Measurement Sensitivity	\$150867
NS135	Smart Antenna Systems in a Wireless Local Area Network	\$248601
NS137	Security of Cyber Systems	\$163921
NS139	Novel Threat-Risk Index Using Probabilistic Risk Assessment and Human Reliability Analysis	\$20049
NS140	Wireless Security Research	\$233132
NS141	Thermomechanical Processing of Titanium 10V-2Al-3Fe	\$150022
NS143	Investigation of New Generation Infrared Imaging Systems for the Stand Off Detection of Suicide Bombing Suspects	\$49482
NS144	Radio Frequency Personnel Identification Tool (The Power Boot)	\$59115
PH103	Residual Hazards Management: Decisions Leading Toward Success or Failure?	\$134716
PH104	Modeling an Earth Borehole System for Physical Property Determination in Shallow Subsurface Environments with Emphasis on Vadose Zone Applications.	\$85194
PH105	Improving Soil Water Flux Estimates in the Deep Vadose Zone	\$77358
PH106	A New Hydrogeophysical Method for Characterizing and Monitoring Preferential Flow Paths in Complex Layered and Fractured Basalt	\$71746
PH107	Dependence of Coal Bed Permeability on Pore Pressure and Adsorbed Gas Content	\$84979
RP100	Laser Ultrasonic Corrosion Monitor	\$248840
RP101	Advanced Test Reactor Three Dimensional Neutronics Modeling	\$236572
RP102	Hollow Waveguide Laser Ultrasonics for High Radiation Environments	\$282598
RP103	Estimation of Neutron Irradiation-Induced Displacements-Per-Atom	\$139099
RP104	Improved Techniques for In-Situ Measurements	\$93154
SC116	Supercritical Fluid Catalyst Regeneration Chemistry	\$146208
SC117	Atmospheric Pressure Surface Analysis Mass Spectrometry	\$131383
SC118	Surface-Sensitive Laser Acoustic Studies of Heterogeneous Catalysis	\$123656
SC119	Development of Microelectrode Arrays for In Situ Detection of Localized Corrosion	\$121797
SC120	Advanced Materials for Power Generation	\$97238

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

INEEL - Idaho National Engineering and Environmental Lab

Project ID	Project Name	FY Total
SC121	Effect of Environmental Variables on Bicarbonate Transport by Marine and Freshwater Cyanobacteria	\$211289
SC122	Synthesis and Characterization of Hybrid Materials for Advanced Membranes and Molecular Ropes	\$210633
SC123	Investigation Into Parallelization of Fate and Transport Models	\$55132
SM101	Development Of Brazing Alloys And Application Methods for Joining Silicon Carbide To Titanium Alloy	\$150091
SM102	Development of Advanced Ceramics for Armor Applications	\$40694
Total # of Projects for INEEL: 74		Total Cost for INEEL: \$11333093*

*Does not include \$481,204 of administrative and related implementation costs.

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

KCP - Kansas City Plant

Project ID	Project Name	FY Total
KC02001-(703522)	Condition-Monitoring of Machinery Using Artificial Intelligence	\$8042
KC02004-(703525)	Advanced Noncontact Inspection Techniques for Precision Dimensional Measurement	\$0
KC02005-(703527)	High-Voltage Cable Insulation Defect Investigation, Detection, and Analysis	\$71
KC02008-(703530)	Research and Evaluation of Controller Area Network (CAN)-based Telemetry	\$29738
KC02009-(703531)	Software-Defined Radio Systems	\$16918
KC02010-(703532)	Specialized Getters for Gases Other Than Hydrogen	\$1705
KC02012-(703536)	Portable Image Recognition and Analysis	\$39630
KC02013-(703561)	Triple Point Field Attenuation for High-Power Ceramic-to-Metal Interfaces	\$90113
KC02024-(703535)	Evaluation of Continuous Tape Casting of Ceramic Materials for Multilayer Structures	\$480
KC03001-(703537)	RFID Tagging of Classified/Sensitive Material/Assets	\$240405
KC03002-(703538)	Evaluate the Feasibility of a Single-Containment Vessel	\$175981
KC03003-(703539)	Suspension-Coated APO-BMI/Carbon Microsphere Molding Compound	\$12975
KC03004-(703540)	Enhanced Hydrogen Getter Development	\$176795
KC03005-(703541)	Integrated Miniaturized Solid-Phase Microextraction/Gas Chromatograph/Mass Spectrometer	\$135061
KC03006-(703542)	Preservation of Digital Data with Knowledge-Based Archives	\$232056
KC03007-(703543)	Nano-fireset Technology	\$138758
KC03008-(703544)	Distributed Initiation Control System	\$86548
KC03009-(703545)	High-Precision Laser Micromachining Development	\$208766
KC03010-(703546)	Packaging of Next-Generation Laser Optics	\$72670
KC03011-(703547)	High-g Penetrator Telemetry Electronics(703547)	\$230606
KC03012-(703548)	Microelectronic System in a Package with High-Density Interconnections	\$211752
KC03013-(703549)	Backend Processing of MEMS(Microelectromechanical Systems)	\$289614
KC03014-(703550)	Wireless Sensor Transmitter	\$182117
KC03015-(703551)	Small-Device Simulation and Modeling of High-Voltage Electromagnetic Field Enhancements, Characteristics, and Sensitivity	\$51637
KC03016-(703552)	Photonic Crystals as Dielectric Mirrors in a Laser Cavity	\$7883
KC03017-(703553)	Biometrics Using High-Resolution Optical Coherence Tomographic Imaging	\$130358
KC03018-(703554)	Knowledge-Aided Sensor Signal Processing & Expert Reasoning	\$46115

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

KCP - Kansas City Plant

Project ID	Project Name	FY Total
KC03019-(703555)	Investigation into Improved Techniques and Processes for Creating Small Holes (.005" Diameter) to Closer Location and Size Tolerances	\$76652
KC03021-(703559)	Finite Element Modeling of Fiber Reinforced Composite Structures	\$2669
KC03022-(703558)	Optimal Resource Allocation using Fuzzy Logic & Neural Nets for the Flexible Manufacturing System	\$37879
KC03024-(703560)	Digitization of Reservoir Process Design and Machine Program Generation	\$291
KC03026-(703562)	Relaxor and Antiferroelectric Material Development For High Energy Capacitors	\$71055
KC03027-(703563)	High Power Ceramic Structure Machining and Characterization	\$182019
KC04001-(703565)	Development of High-performance Microwave Packaging for Radio Frequency (RF) Micro-Electromechanical Systems (MEMS)	\$87793
KC04002-(703567)	Demonstrate a Compact, Integrated Test Unit for Verifying Surface Cleanliness	\$76269
KC04003-(703568)	Molecular Design & Optimization of Urethane Encapsulants	\$53580
KC04004-(703569)	Laser Welding of Small Parts Fabricated Using LIGA Processes	\$79847
KC04005-(703570)	Three-Dimensional Borescope with Eddy Current Probe	\$32202
KC04006-(703571)	Pulsed Power Communication Device	\$31399
KC04007-(703572)	Characterization and Application of Non-Contact Inspection Technology	\$169032
KC04008-(703573)	Multi-chip Module Transverter Circuit	\$217083
KC04009-(703574)	Application of Diskless Workstation Technology to Computationally Intensive Manufacturing Applications	\$227089
KC04010-(703575)	Setback Generator for Microfiring Systems	\$122634
KC04011-(703576)	Investigation of Electromagnetic Methods for Examination of Reservoir and Other Welds	\$17596
KC04012-(703577)	Advanced Computer User Authentication Methods	\$192193
KC04013-(703578)	Design Guides for Rapid and Flexible Test Equipment Software Development	\$40430
KC04014-(703579)	Robust Feature Extraction/Pattern Matching Algorithms in Unconstrained Environments	\$236794
KC04015-(703580)	An Accurate and Reliable Multiple Integrated Laser Engagement System (MILES) Compatible Semi-Automatic Pistol for Force-On-Force Engagement Training	\$230351
Total # of Projects for KCP:	48	Total Cost for KCP: \$5001651*

*Does not include \$93,913 of administrative and related implementation costs.

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-2000510DR	A Scaleable Silicon-Based Nuclear Spin Quantum Computer	\$217991
LANL-2001222ER	Scanning Tunneling Microscope Electron Spin Precession Detection for Fundamental Physics and Nanotechnology	\$328903
LANL-2001511DR	Development of High Performance Cold Neutron Spectroscopy at LANSCE	\$797450
LANL-2001518DR	Alpha Models: A Unique Opportunity in Fundamental Fluid Turbulence	\$585365
LANL-2001553DR	Physics Issues in Proton Radiography	\$400677
LANL-2001606DR	Scientific Opportunities With High Intensity Pulsed Cold and Ultra-Cold Neutron Sources	\$513016
LANL-2001607DR	Research to Support Simulation of Complex Biological Systems	\$490223
LANL-2001609DR	Performance Analysis and Modeling of Extreme-Scale Parallel Architectures	\$348643
LANL-2001926ER	Plasma Generation of Nanoparticles	\$217683
LANL-2001938DR	An Operating System for Scientific Computing	\$217495
LANL-20020003DR	Nuclear Isomer Physics	\$1241268
LANL-20020006ER	Unstable Fluid-Fluid Interfaces	\$215087
LANL-20020007ER	Quantum Dynamics and the Quantum-Classical Transition with Entangled Spinor Wavepackets	\$150990
LANL-20020008ER	Mobility and Integrity of the Bacterial Chromosomal Gene Pool	\$207512
LANL-20020009ER	Cooling and Trapping Molecules with Laser Light	\$239272
LANL-20020010ER	Macroscopic Matter Wave Dynamics	\$160428
LANL-20020011ER	Unlocking the Mechanism of Protein Biosynthesis: Computational Investigation of the Ribosomal Functional Complex	\$209288
LANL-20020012ER	Protein Machines: Regulation of Enzyme Function Through Substrate and Protein Interactions	\$145283
LANL-20020014ER	Chemistry of the f-Block Elements in Room Temperature Ionic Liquids	\$158869
LANL-20020015ER	Quantum Wavepacket Dynamics with Trajectories	\$218165
LANL-20020016ER	New Catalysts Containing Phosphenium Groups for Chemical Conversions	\$420391
LANL-20020017ER	Excited States Dynamics and Photochemical Reactions in Large Molecular Systems	\$226030
LANL-20020018ER	Polymeric Chelators for Radioisotope Delivery Systems	\$254095
LANL-20020019ER	Advanced Techniques in Discrete Simulation	\$218667
LANL-20020020ER	Estimating the Bayes Error from Empirical Data	\$211357

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20020021ER	Identification of Interests, Trends and Dynamics in Document Networks	\$106693
LANL-20020022ER	Distributed Sensor Networks with Collective Computation for In-Situ Sensing	\$206821
LANL-20020023ER	Enabling Energy & Environmental Security: Chemical Extraction of Carbon Dioxide from Air	\$286914
LANL-20020024ER	Bone Morphogenesis and Regulation by External Fields	\$169327
LANL-20020025ER	Hydrogen Generation for Fuel Cells by Solid-Electrolyte Membrane Partial Oxidation Reactor	\$218176
LANL-20020026ER	Time Reversed Acoustics Applied to the Earth	\$212713
LANL-20020027ER	General Relativistic Astrophysics of Compact Sources: Core-Collapse Supernovae and Gamma-Ray Bursts	\$255833
LANL-20020028ER	Photon-Counting Optical Spectrophotometry: Opening a New Window for Discovery in Astrophysics	\$229850
LANL-20020029ER	Radio Emissions from Cosmic-Ray/Atmosphere Interactions	\$198588
LANL-20020030ER	Ultrafast Broadband Optical Spectrometer for Dynamic Materials Characterization in a Magnetic Field	\$227573
LANL-20020031ER	Real-Time Localization and Presentation of Neural Activity	\$227519
LANL-20020032ER	Vibration-Free Cooling for Precision Cryogenic Measurements	\$180371
LANL-20020033ER	Single-Domain Nanomagnets: Fabrication and Studies Through the Superparamagnetic Transition	\$236534
LANL-20020034ER	Nanostructured Metals with Unusually High Fatigue Strengths	\$201909
LANL-20020035ER	New Vortex Phases in Layered Magnetic Superconductors	\$192798
LANL-20020036ER	Low Temperature Solid Solution Softening in Ordered Intermetallic Alloys - Towards Improvement of Ductility in High Temperature Materials	\$209100
LANL-20020037ER	Algebraic Approach to Interacting Quantum Systems	\$187750
LANL-20020038ER	Eliminating Short Time-Scales in Long-Term, High-Resolution Studies of Ocean Circulation: A First in Climate Modeling	\$184345
LANL-20020039ER	Statistical Properties of Granular Chains	\$173972
LANL-20020040ER	Implicit Subgrid Turbulence Modeling	\$170789
LANL-20020041ER	Development of an Experiment to Measure Neutron Beta Decay Parameters with a Polarized Cold Neutron Beam	\$199777
LANL-20020042ER	The Electric Dipole Moments and Time Reversal Violation in Low Energy Processes	\$277995
LANL-20020043ER	Study of Open-Charmed Production at RHIC	\$222722

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20020046DR	Understanding Protein Function: From Chemical Reaction to Molecular Recognition	\$1304054
LANL-20020047DR	Electronic Devices Based on Nano-cell Organic Crystals	\$990176
LANL-20020048DR	Bringing Genomes to Life with Phage Antibodies and Mass Spectrometry	\$980501
LANL-20020050DR	Beryllium Chemistry: Toward an Understanding of Chronic Beryllium Disease	\$1123090
LANL-20020051DR	Life Cycles of Active Galaxies	\$974776
LANL-20020052DR	Applied Quantum Technologies	\$1285759
LANL-20020053DR	Probing the Structural Dynamics of Condensed Matter with Ultrafast X-ray Diffraction	\$981664
LANL-20020054DR	Machine Learning for Real-World Data Analysis	\$851773
LANL-20020055DR	New Windows into Shocks at the Mesoscopic Scale	\$1012754
LANL-20020064DR	Interacting Complex Systems	\$1244431
LANL-20020071DR	Damage Prognosis Solutions	\$495141
LANL-20020072DR	Experimental Investigation of Fundamental Processes Relevant to Fusion Burning, Strongly Coupled, Multi-Material Plasmas	\$910254
LANL-20020073DR	Advanced Arbitrary Lagrangian-Eulerian Methods for Complex Flows in Weapons	\$499064
LANL-20020077PRD	Consequences of Competing Interactions on Quantum Phase Transitions in Many-Particle Systems	\$2829
LANL-20020078PRD	Investigating the Kinetics of Free Radical Photo-Polymerizations for Nano-Scale Systems	\$29763
LANL-20020081PRD	Protein Dynamics/Multidimensional Spectroscopy	\$10660
LANL-20020084PRD	Elementary Particle Theory, General Relativity and String Theory	\$23862
LANL-20020103PRD	Ion-Cutting and Bonding of Silicon	\$29423
LANL-20020134PRD	Spectroscopic Investigation of Molecular Interactions in Dye-Sensitized Solar Cells	\$39382
LANL-20020135PRD	Low Temperature Spectroscopic Studies of Individual Nanocrystals	\$22755
LANL-20020136PRD	Sensors for Siderophores Based on Pheromone Detection	\$60573
LANL-20020138PRD	Quantifying the Relationship between the Nature of Structural Defects, the Defect Density, and the Hydration State of Clay Minerals and their Interaction with Fluids	\$15374
LANL-20020143PRD	Quantum Control in Atom Optics	\$20487
LANL-20020161PRD1	Tools for Realizable Quantum Information Processing	\$92416

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20020167PRD1	Solid State Systems for Electric Dipole Moment Searches	\$88883
LANL-20020171PRD1	High Pressure Synthesis and Characterization of Clathrates	\$60593
LANL-20020183PRD1	Search for Quantum Critical Points using High Magnetic Fields	\$55102
LANL-20020194PRD1	Fracture and Crack Growth Behavior in Nanostructured Materials Under Cyclic Loading	\$34212
LANL-20020198PRD1	Arid Land Soil Microbial Processes and Communities	\$36952
LANL-20020202PRD1	The Origin of Elastic Nonlinear Response	\$35593
LANL-20020205DR	Advanced Linux for High Performance Computing	\$477458
LANL-20020222ER	Energy Conversion and Photonics Based on Metal Complex Excited States	\$111803
LANL-20020225ER	Interfacial Solutions: Quasiliquids and Tropospheric Chemistry	\$138218
LANL-20020252PRD2	Interface-Controlled Deformation Physics of Nanolayered Metals	\$56098
LANL-20020288PRD2	Chemical Tuning and Disorder in Quantum-Critical Superconductors	\$88977
LANL-20020299PRD2	Neutron Scattering Study on Quantum Magnetism in Correlated Electron Materials	\$92748
LANL-20020304PRD2	Ultrafast Studies of Dynamics in Condensed Matter Systems	\$90003
LANL-20020360ER	New Modeling Techniques for Strongly-Coupled Atmospheric Processes that Occur in Wildland Fires	\$170838
LANL-20020393PRD3	Synthesis and Characterization of Nanomaterials	\$115554
LANL-20020396PRD3	Long-Time Dynamics of Floppy Systems	\$80812
LANL-20020399PRD3	Crystallization Mechanism in Metal-Oxide Thin Films	\$108243
LANL-20020417PRD3	Electron Microscopy Study of Defects at Interfaces in Nano-Scale Films	\$81283
LANL-20020420PRD3	Numerical Determinations of Viscoelastic Effect on Volcanic Deformation: A Tool for Eruption Prediction	\$103087
LANL-20020421PRD3	Dynamics of Granular Media	\$115561
LANL-20020459ER	Ultrahigh Weight Biomolecule Separation and Detection	\$261207
LANL-20020463ER	Nanochemistry of Catalysts	\$70104
LANL-20020494PRD4	Preparation and Characterization of Monodisperse Semiconductor Quantum Dots: Towards True Artificial Atoms	\$108469
LANL-20020505PRD4	The Effect of Forest Disturbance and Climate Change on the Isotopic Composition of Tree Rings and Respired Carbon Dioxide	\$101545
LANL-20020517PRD4	The Synthesis of Metal Complexes Containing Actinide-Transition Metal and Actinide-Actinide Metal Bonds	\$112258

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20020521PRD4	Novel Structures Based on Multicompartment Self-Assembly of Fluoro/Hydro-Carbon Surfactants	\$132772
LANL-20020525PRD4	Electronic Pumping of Nanocrystalline Quantum Dots	\$118839
LANL-20020529PRD4	Advanced Computational Methods in Mobile Computing and Computational Biology	\$59576
LANL-20030022DR	Novel Physical Behavior of Nanostructured Materials Derived from Interface Atoms	\$1196765
LANL-20030029DR	Structural Bioinformatics: Inferring Protein Function from Sequence and Structure on a Genomic Scale	\$1347761
LANL-20030030DR	Neutrino Physics and Fundamental Symmetries	\$1427067
LANL-20030036DR	New States of Matter Near Zero-Temperature Phase Transitions	\$1786619
LANL-20030037DR	Physics-Based Analysis of Dynamic Experimentation and Simulation	\$1251794
LANL-20030038DR	Stochastic Closure for Multi-Scale Simulations	\$516030
LANL-20030050DR	Scaling Relationships in Biology: Developing and Applying a Unifying Theory from Molecular through Biosphere Scales	\$1694922
LANL-20030059DR	Clathrate Hydrate Science and Technology	\$1296575
LANL-20030067DR	Water on Mars	\$1178526
LANL-20030068DR	Non-equilibrium Electron Spin Transport and Dynamics in Solids	\$1504726
LANL-20030069DR	Interfacial Energy and Charge Transfer in Multifunctional Bio-Inspired Nano-Assemblies	\$1294461
LANL-20030084DR	Quasiparticles and Phase Transitions in High Magnetic Fields: Critical Tests of our Understanding of Plutonium	\$1367952
LANL-20030091DR	Actinide Partitioning at Solid-Solution Interfaces	\$1202070
LANL-20030119ER	Synthesis of Labeled Glycosaminoglycans for Structural and Dynamical Studies of Macromolecular Complexes	\$327653
LANL-20030129ER	Collisionless Magnetic Reconnection in 3D Geometries	\$252023
LANL-20030137ER	Improving Local Search	\$281964
LANL-20030138ER	Computational Study of Intense Short-Pulse Laser-Matter Interactions	\$274738
LANL-20030151ER	Calculating the Kaon Bag Parameter B_K on Unquenched Lattices	\$282908
LANL-20030162ER	Automatic Detection of Salient Objects in Real-World Imagery	\$237001
LANL-20030169ER	Determining Fundamental Roles of Magnetic Field in the Universe: Laboratory Plasma Flow Experiments on Magneto-Rotational Instability (MRI) and Laminar Plasma Dynamo	\$253757

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20030179ER	Bacillus Anthracis Iron Acquisition	\$267061
LANL-20030181ER	Efficient Computation of Free Energy Differences Relevant to Rational Drug Design	\$240046
LANL-20030210ER	Measure-Valued Solutions of the Lagrangian-Averaged Euler Equations	\$301393
LANL-20030216ER	Strong Ultrafine Grain Metals by Severe Plastic Deformation and Strain Path Changes: Application to Beryllium (Be)	\$261183
LANL-20030225ER	Processor-Coupled Computing Fabric	\$199689
LANL-20030227ER	Estimation of Aquifer Recharge Using Time-Lapse Gravity Surveys	\$226669
LANL-20030232ER	Catalysis by Artificial Inorganic Enzymes	\$255149
LANL-20030248ER	Distributed Multi-scale Markov Chain Monte Carlo for Uncertainty Quantification in Inverse Problems	\$283071
LANL-20030251ER	Using Neutrons to Explore Peculiar Elastic Behavior of Rocks	\$180704
LANL-20030258ER	Immune Cell-Based Biosensor for Rapid Pathogen Detection and Identification	\$274754
LANL-20030261ER	Transport Studies of Vortex Motion in High Temperature Superconductors, MgB(2), and Borocarbides.	\$277286
LANL-20030292ER	Synthesis and Characterization of Selective Ligands	\$431827
LANL-20030301ER	Magnetocarcinotherapy: A Novel Molecular Imaging Diagnostic and Treatment Method for Cancers	\$266823
LANL-20030310ER	Polymer-Assisted Aqueous Deposition (PAAD) of Metal-Oxide Films	\$204904
LANL-20030317ER	Three Dimensional Effects in Core-Collapse Supernovae: Rotation, Convection and Neutron Star Kicks	\$159206
LANL-20030351ER	Computational Schemes for Multiscale Modeling of Polymers	\$214665
LANL-20030352ER	Double Beta Decay	\$218576
LANL-20030355ER	Thin-Film Semiconductor Sensors on Polycrystalline Substrates	\$356849
LANL-20030356ER	An Integrated Microarray-Based Platform for Sensitive High-Throughput Pathogen Detection and Identification	\$380635
LANL-20030359ER	Electrically Pumped Colloidal Nanoemitters: Combining Top-Down and Bottom-Up Approaches in Nanoscale Engineering	\$254291
LANL-20030360ER	Viral Invasion: Breaching the Cells Outer Defenses	\$279847
LANL-20030363ER	Testing for a Relativistic Symmetry in the Nucleon-nucleon Interaction	\$160187
LANL-20030365ER	Cosmological Vacuum Energy	\$231644
LANL-20030398ER	Desalination by Molecular Design	\$207330

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20030400ER	Atomic Level Engineering of Nanostructures and Devices	\$251977
LANL-20030419DR	Assembly and Actuation of Nanomaterials Using Active Biomolecules	\$508879
LANL-20030420DR	Active Photonic Nanostructures	\$620472
LANL-20030486DR	Astrophysical Survey Science and Technology	\$477463
LANL-20030487DR	Physics of Information	\$1114852
LANL-20030488ER	Formation and Distribution of Galaxies: An Advanced Computational Approach	\$368272
LANL-20030489DR	Advanced Diagnostics for Characterizing Nanoscale Materials	\$956339
LANL-20030494ER	Design of the Next Generation Ground-Based Gamma-Ray Burst Detector	\$77384
LANL-20030497PRD1	Analysis and Generation of Magnetic Flux Pinning Sites in YBa2Cu3O7-d Films	\$104182
LANL-20030508ER	Mass Spectrometry and Systems Biology Based Approach for Identifying Biomarkers in Cancers	\$251984
LANL-20030519PRD1	Solid-State Actinide Chemistry	\$128480
LANL-20030522PRD1	Searching for Superhard Materials from Nanometric Scale and at Extreme Conditions	\$143587
LANL-20030526PRD1	Identification of the Energy Gap in the 2D Metallic State of Strongly Interacting Fermions	\$127176
LANL-20030534PRD1	Genomic Instability and Mammalian Aging	\$48898
LANL-20030544PRD1	Ultracold Collisions of Charged Particles	\$112822
LANL-20030549PRD1	Physics of Metallo-Organic / Organic Materials and Devices	\$76721
LANL-20030562PRD1	Synthesis of Continuous Carbon Nanotubes	\$119021
LANL-20030568PRD1	Interaction of Magnetism and Superconductivity in Novel Superconductors	\$138307
LANL-20030579PRD1	Cosmic Cinematography: Opening a New Window for Discovery in Astrophysics	\$129181
LANL-20030597ER	LOFAR - A Low Frequency Radio Interferometer for Astronomy and Space Sciences	\$33063
LANL-20030604ER	Preparation & Characterization of Inorganic & Organic High-Nitrogen Energetic Materials	\$24714
LANL-20030611PRD2	Active Photonic Structures Based on Semiconductor Nanocrystals	\$33051
LANL-20030619ER	Study of Dielectric Properties of Liquid Helium	\$72130
LANL-20030622ER	Complex Dynamical Earth Systems	\$450116
LANL-20030623ER	Space Weather Foundations	\$340322

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20030624ER	Dynamical Astrophysics	\$388359
LANL-20030625ER	Planetary Geophysics-Core to Crust	\$392669
LANL-20030635PRD2	Theoretical and Computational Studies of the Behavior of Plasma at the Edge of a Tokamak	\$103370
LANL-20030637PRD2	Global Three-Dimensional Magnetospheric Structure	\$112437
LANL-20030642PRD2	Superheating upon Superfast Dynamic Loading	\$141832
LANL-20030643PRD2	Theoretical Studies of Advanced Materials	\$102392
LANL-20030663PRD2	Electric Field Control of Optical and Electronic Properties of Semiconductor Quantum Dots	\$101219
LANL-20030664ER	Compton Enhanced Gamma Reconstruction	\$74937
LANL-20030666PRD2	Host-Pathogen Interactions of Intracellular Microbes	\$104685
LANL-20030671ER	New Directions in Catalysis	\$37742
LANL-20030672ER	Novel Optical Processing Methods	\$44886
LANL-20030680PRD2	Pattern Formation and Dynamics in Systems with Competing Forces	\$97983
LANL-20030699PRD3	Trace-Level Analysis of Radionuclides Using Membrane-Based Ion-Selective Chemical Sensors	\$107646
LANL-20030700PRD3	Wiedemann-Franz Law at a Quantum Critical Point	\$24254
LANL-20030718PRD3	Neutrino Physics, Astrophysics and Cosmology	\$114593
LANL-20030744PRD3	Investigation of Electrical Properties of [Ba _{1-x} Sr _x TiO ₃ /Ba _{1-y} Sr _y TiO ₃] Multilayers for Applications in Tunable Microwave Devices	\$101393
LANL-20030760ER	Selection of Binding Agents Against SARS Proteins for Diagnosis and Therapy	\$99706
LANL-20030766PRD3	Development of Self-Monitoring and Self-Repairing Structural Systems using Smart Materials	\$130883
LANL-20030770PRD3	Short-Term Decoherence in Quantum Optics	\$81892
LANL-20030811PRD4	Fracture and Damage Evolution of Fluorinated Polymers	\$109019
LANL-20030835PRD4	The Early Afterglows of Gamma-Ray Bursts	\$24101
LANL-20030837PRD4	An Organometallic Chemistry Approach to the Preparation of Fluorinated Polymers	\$108125
LANL-20030839ER	Proteins in Protein Networks	\$416127
LANL-20030840PRD4	Fosmidomycin and B. Anthracis	\$82568
LANL-20030859PRD4	Fault Tolerant and Recovery-Oriented Computing	\$88650

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20030861PRD4	Mechanisms of Creep in Bulk Metallic Glasses	\$99267
LANL-20030865PRD4	Compton Imaging and High Energy Astrophysics	\$102813
LANL-20030874PRD4	Ion Beam Slicing with Point Defect Engineering	\$118943
LANL-20040014DR	Localization and Itinerancy in Plutonium	\$1609629
LANL-20040031DR	Scalable Reconfigurable Computing: Exploiting an Exponential Increase in Computational Density	\$988433
LANL-20040040DR	Search for Variation of the Fine Structure Constant with Optical Frequency References	\$1358637
LANL-20040042DR	Science of Geological Carbon Sequestration: Integration of Experimentation and Simulation	\$1019164
LANL-20040049DR	Solid-State Quantum Information Processing : A New Approach to Demonstrate Quantum Entanglement	\$991728
LANL-20040064DR	Energetic-Particle Interactions with Dense Plasmas: A Study Relevant to Boost and to Fast Ignition Using Laser-Driven High-Current Charge-Neutralized, MEV/Nucleon Ion Beams	\$1404514
LANL-20040069DR	High-Power MM-Wave Source Technology	\$1063559
LANL-20040072DR	Radiography with Background Radiation	\$1647871
LANL-20040087DR	Understanding the Molecular Mechanisms of Pathogen Recognition by the Immune System: Biothreat Reduction through Predictive Science	\$1392480
LANL-20040093DR	Understanding Electronic and Magnetic Communication Between f-Electrons in Actinide and Lanthanide Materials	\$1463195
LANL-20040104DR	Testing Time-Reversal Symmetry with Ultracold Neutrons and with Solid State Systems	\$1328237
LANL-20040120DR	Fluorobody Switches: Recognition Proteins Which Fluoresce upon Binding Targets	\$1306782
LANL-20040134DR	Bose-Einstein Condensate Physics: Dynamics and Applications	\$1793735
LANL-20040141DR	Statistical Physics of Infrastructure Networks	\$1499076
LANL-20040167ER	Exploring the Turbulent-Viscosity Effect in Solar-Wind/Magnetosphere Coupling	\$105865
LANL-20040171ER	Fermion Quantum Phase Transitions	\$266806
LANL-20040184ER	Response Networks of M. Tuberculosis and Bio-threat Agents	\$236313
LANL-20040187ER	Electroweak Symmetry Breaking	\$325042
LANL-20040193ER	Dark Lightning: Throwing Light on Monster Convective Storms	\$179775

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20040195ER	Precision Cosmology: A First Principles Approach to Galaxy Clustering	\$395698
LANL-20040201ER	The Dynamic Response of Polymers Under Stress Using a Unique Probe for the Molecular Events Governing Materials Responses	\$208679
LANL-20040212ER	Detecting Weak Gaseous Plumes in Hyperspectral Remote Sensing Imagery	\$255156
LANL-20040213ER	Ion-Beam Synthesis and Luminescence Characterization of a New Class of Nanomaterials-Nanophosphors	\$321454
LANL-20040218ER	Error-Minimizing, Implicit Adaptive-Grid Solutions of Time Dependent Problems	\$223372
LANL-20040236ER	Computational Complexity and Quantum Entanglement	\$192311
LANL-20040237ER	New Mathematical Tools for the Quantum Dynamics of a Bose-Einstein Condensate	\$229737
LANL-20040256ER	Hybrid Density Functional Theory Investigations in Condensed Matter	\$269394
LANL-20040259ER	Nonlinear-Acoustic Tomographic-Imaging of Damage in Solids	\$289221
LANL-20040262ER	Understanding and Predicting the Initiation of DNA Transcription	\$225839
LANL-20040284ER	The Dynamics of Two-Dimensional Turbulence	\$366452
LANL-20040291ER	Tracking Single Molecules in Three Dimensions	\$230199
LANL-20040294ER	Study of Phases with Hidden Order Parameter in the Actinides and other Strongly Correlated Electron Systems	\$227786
LANL-20040295ER	Design Principles of Genetic Regulatory Networks	\$260255
LANL-20040301ER	Understanding Global Planetary Processes Through a Study of the Moon's Surface Composition	\$277420
LANL-20040326ER	Massively Parallel Fabrication of Complex Nanoscale Structures in Soft Materials	\$349246
LANL-20040344ER	Understanding and Controlling the Chemistry of Biocidal Polymers	\$213456
LANL-20040358ER	Measurement of Vibrational Anharmonicities for Chemical Dynamics	\$334383
LANL-20040359ER	Spatially-Isochronous Time-of-Flight Mass Spectrometer	\$236310
LANL-20040379ER	Modeling Invariance in Data Space	\$290076
LANL-20040391ER	Quantum Devices for Electronic Circuitry and Advanced Detection	\$251495
LANL-20040393ER	Genetic Programs Underlying Key Physiological States in Burkholderia Pseudomallei	\$252340
LANL-20040408ER	Coherent Control of the Raman Fingerprint Spectrum via Single-Pulse Coherent Anti-Stokes Raman Scattering	\$258123

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20040412ER	Mining the Sky with Both Eyes Open: Stereoscopic Monitoring of the Night Sky	\$414097
LANL-20040415ER	Supernovae Neutrinos	\$318536
LANL-20040419ER	Statistical Models for Natural Hraphs	\$226186
LANL-20040425ER	A Dynamic 2-D Ultrasonic Particle Trap for Particle and Cell Array Processing of Biological Assays in Micro-Fluidic Channels	\$350645
LANL-20040430ER	Synthesis of Continuous Carbon Nanotubes	\$279189
LANL-20040438ER	Quantum Control and Information Processing Using Semiconductor Quantum Dots	\$327491
LANL-20040454ER	High Throughput Isolation of Optimal Protease Substrates	\$324070
LANL-20040461ER	Secure Communications in Fiber Links Using Randomness and Nonlinearity of Optical Fibers	\$211234
LANL-20040478ER	Hyperthermal Surface Ionizer for Aerosol Chemical and Biological Analysis	\$340397
LANL-20040480ER	Self-Healing High-Perfomance Parallel Computers	\$241838
LANL-20040481ER	Efficient Modeling of Systems with Uncertainty on Multiple Scales	\$207562
LANL-20040508ER	The Synthesis of Single Walled Carbon Nanotubes with Specific Diameters	\$317690
LANL-20040558ER	Characterizing Thin Films by Laser-Generated Acoustics	\$197153
LANL-20040840DR	Computational Models of the Water Cycle of Semi-Arid Basins	\$489221
LANL-20040842DR	Fission Fragment Physics in Extreme Environments (U)	\$421024
LANL-20040844DR	Phase Transitions and Strong Anharmonicities in Plutonium	\$1805455
LANL-20040848ER	Exploring Novel Magneto-Electric Phenomena in Frustrated Spin Systems	\$380107
LANL-20040849ER	Imaging Optical Interferometry	\$460053
LANL-20040862ER	Software-Based, Power-Aware Computing	\$150950
LANL-20040873ER	Integration of Disparate Sensor Systems/Data Sources for Homeland Security	\$71805
LANL-20040877ER	Investigating the Mullin's Effect in Silica-Filled Polymers	\$23826
LANL-20040882PRD1	Exploring Protein Cameleons Using Single Molecule Spectroscopy	\$41469
LANL-20040884PRD1	Microscopic High Stiffness and High Damping Materials	\$8119
LANL-20040885PRD1	Mechanistic Studies on Fe(III)(hydr)oxide Dissolution and Actinide Mobilization in an Aqueous Aerobic Environment	\$34948
LANL-20040894ER	Theory of Detonation in Heterogeneous Explosives	\$70895
LANL-20040895ER	Probing Nucleosynthesis with DANCE	\$72685

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20040897PRD1	Supernova Light Curves	\$4085
LANL-20040908PRD1	Thermal Shrinkage and Compressional Expansion in Framework Oxides: Underlying Structural Mechanisms and Phase Stability	\$44777
LANL-20040909PRD1	New Theoretical and Computational Approaches to Ultra-Relativistic Heavy Ion Collisions	\$36060
LANL-20040919PRD1	Optical Probing of Dense Structured Media: 3D Radiative Transfer Theory at Work	\$47002
LANL-20040923ER	Development of Technology for Particle Astrophysics and Other Applications	\$44115
LANL-20040937PRD2	Valence Ambiguity in Organoactinide Chemistry	\$26501
LANL-20040938ER	Fission-Fragment Scattering Within Actinide Crystal Structures	\$57720
LANL-20040941PRD2	Magnetic Field Induced Quantum Critical Points in Correlated Electron Systems	\$30868
LANL-20040953PRD2	Multifunctional Homogeneous Catalysis for Alkane Functionalization	\$26027
LANL-20040961PRD2	Femtosecond Optical Combs for Precision Spectroscopy	\$46284
LANL-20040967PRD2	High Resolution Retinal Prosthesis: Theory and Experiment	\$50958
LANL-20040969PRD2	Coherent Terahertz Radiation From Intense Laser-Produced Plasmas	\$36531
LANL-20040980DR	Advanced Computer Architectures and Algorithmic Implications	\$948230
LANL-20040985PRD3	MiniBooNE Neutrino Oscillation Analysis	\$39103
LANL-20040990ER	Time Critical Threat Detection and Evidence Marshaling	\$290624
LANL-20040991ER	Practical Discharge-Pumped, Dressed Atom, Coherent Light Amplifiers and Generators	\$29206
LANL-20040992ER	Novel Polymers for Fuel Cells	\$250920
LANL-20040993ER	Coarse-Grained Model for Polymer Solutions	\$79636
LANL-20040994ER	Beryllium Alanate as a Hydrogen Storage Media	\$52319
LANL-20040995ER	Understanding the Ultra-High-Energy Cosmic Rays with the High Resolution Fly's Eye Detector	\$108386
LANL-20040996ER	Radiation Transport Code Development for Satellite and Other Space Probes	\$343525
LANL-20040997ER	Intrinsic Nanoscale Quantum-Coherent Switches	\$226694
LANL-20040998ER	Host-Pathogen Interactions	\$68766
LANL-20041005PRD3	Infinite Layer High-Tc Cuprate Superconductors	\$29532
LANL-20041010DR	Dynamics of Complex Networks: Biology, Information, and Security	\$377253
LANL-20041027PRD3	Materials Interactions with Terahertz Radiation	\$19151

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LANL - Los Alamos National Lab

Project ID	Project Name	FY Total
LANL-20041034PRD3	Rydberg Atom Interactions in Fields and Plasmas	\$1753
LANL-20041075ER	Investigations into the Fundamental Chemistry and Structure of Hybrid Organic-Inorganic Materials	\$122614
LANL-20041078ER	Nano-Scale Physics and Near-Contact Hydrodynamics	\$108066
LANL-20041086ER	Nuclear Materials Detection Algorithm Development for Port-of-Entry Applications	\$27380
LANL-20041091ER	Generation of Novel Materials with Applications to LANL Programmatic Goals	\$9678
LANL-20041097PRD4	High Precision Measurements of CO2 and O2 to Determine Variability of Soil Carbon Turnover Time	\$26756
Total # of Projects for LANL:	297	Total Cost for LANL: \$102147359

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LBNL - L. Berkeley National Lab

Project ID	Project Name	FY Total
LB01024	Dynamic Reorganization of Chromosome Architecture During Meiosis	\$61967
LB02001	Novel Terahertz and Infrared Source using a Laser Wakefield Accelerator and Applications	\$199101
LB02002	Solid-State Quantum Computer Development with Single Ion Implantation	\$146816
LB02004	Development of a Coherent Far-Infrared Synchrotron Radiation Source	\$228993
LB02006	Simulations of Femtosecond X-Ray Spectra of Photoexcited Molecules	\$73169
LB02009	Disorder and Multiple Length Scales in Non-Fermi Liquid f-Electron Intermetallics	\$74693
LB02010	Investigation of Charge Transfer in Organic Electronics Using Ultrafast Spectroscopy and Targeted Synthesis	\$119511
LB02012	Experimental Mathematicians Toolkit	\$59994
LB02013	Infrastructure for Improving Protein Structure Predication in Computational Biology	\$150016
LB02014	New Machine Learning and Data Mining Methods for Genomics and Climate Data Analysis and Knowledge Discovery	\$86023
LB02018	Combinatorial Algorithms in Scientific Computing	\$68969
LB02020	Microbial Controls on Metals in the Environment	\$150000
LB02026	Reactivity of Nanoparticles in Natural Environments	\$79999
LB02028	Miniaturized Systems for Particle Exposure Assessment	\$16913
LB02031	Systems Biology: Biological Input-Output Devices	\$119937
LB02039	Effective Field Theory for Few and Many-Body Nucleon Systems	\$101000
LB02040	Allosteric Mechanisms in Protein Kinases	\$125042
LB02041	Structure and Functional Characterization of Heme Protein Sensors	\$99621
LB02043	Coherent Control and Quantum Information in Polyatomic Molecules	\$259334
LB02044	Scientific Investigations and Technique Development of Wet Spectroscopy, High-Pressure Photoelectron Spectroscopy, and Scanning Transmission X-ray Microscopy for Molecular Environmental Science	\$139895
LB02045	Parallel Methods for Robust Optimization and Uncertainty Quantification	\$105403
LB02048	Research on a Next Generation Vertex Detector	\$100004
LB02049	Conformation and Reaction Dynamics at the Single Molecule Level	\$85780
LB03002	Molecular Control of Interfaces Between Biological and Synthetic Materials	\$226758
LB03004	Comparative Studies Between Earth and Planetary Sciences	\$50000

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LBNL - L. Berkeley National Lab

Project ID	Project Name	FY Total
LB03006	Microscopic Imaging in High-Throughput Screening for Crystals of the Bacterial Ribosome	\$75228
LB03008	Application of Real-Time PCR with Reverse Transcription for Quantification of Specific Microbial Activity in Complex Communities	\$71999
LB03009	Short Period Superconducting Undulator Development	\$117059
LB03012	Interactive Visualization Methods for Exploration and Comparison of Multi-Billion Base Pair Sequence Data	\$79887
LB03013	Novel Ultra-high Resolution (to 10 meV) Inelastic Scattering Spectrograph to Study Coupled Electron-Orbiton-Phonon Interactions	\$167735
LB03015	Determining the Light-Absorbing Properties of Aerosol Particles	\$104110
LB03017	Modeling Quantum Coherence and Transport in Nanoscale Spin, Charge, and Flux Devices	\$54914
LB03019	Aberration Correction of Electron Microscopes	\$125603
LB03020	Ex-Situ and Remote Molecular Imaging and Spectroscopy	\$379599
LB03021	Optimal Solvers for Infinite-Dimensional Hamiltonian Systems	\$93807
LB03022	Superconducting Magnet Systems for Ex Situ NMR Spectroscopy	\$116731
LB03023	Soft X-Ray Spectroscopy of Liquid Surfaces	\$104330
LB03024	Characterization of Adult Stem Cell Involvement in Mammary Gland Development	\$73694
LB03027	Evaluation of Dynamic Air Quality Impacts of Distributed Generation	\$69999
LB03028	Electron Production and Collective Field Generation in Intense Particle Beams	\$95468
LB03030	Evolution of Computer Architecture Alternatives	\$174923
LB03032	Identification and Analysis of Determinants of Centromere Identity in Drosophila	\$174664
LB03033	Future Experiments in Neutrino Physics	\$64000
LB03034	Identification and Characterization of Conserved Noncoding Sequences Using Comparative Genomics and Transgenic Technology	\$64925
LB03035	Microscopic Theory of Protein Surface: Structure, Response, and Design	\$180059
LB04001	Properties of Nanocrystals under Extreme Conditions	\$157884
LB04002	Membrane-Protein Cryo-EM	\$99904
LB04003	High Throughput Strategy for Protein Complex Identification	\$195575
LB04004	Autonomous Sensors for Ocean Dissolved Organic Matter	\$232563

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LBNL - L. Berkeley National Lab

Project ID	Project Name	FY Total
LB04005	Development of Biosensors for Endocrine Disrupting Compounds in Agricultural Watersheds	\$67979
LB04006	Analysis of Complex Phosphorylation Patterns in a Key DNA Repair Protein by Coupling Surface Plasmon Resonance and Tandem Mass Spectrometry	\$161890
LB04007	Techniques of Sample Controls for a Transmission Electron Aberration-corrected Microscope	\$184026
LB04008	Gold-mediated Assembly of Germanium Island Arrays on Silicon	\$110521
LB04009	Next Generation Codes for Modeling Subsurface Processes	\$143926
LB04010	Molecular Microscopy and Tomography	\$74715
LB04011	Functional Interpretation of Cancer Genomes	\$684944
LB04012	Designing a Novel Reactor Neutrino Experiment for Measuring the Mixing Angle Theta13	\$263332
LB04013	Coherent X-ray Diffraction Imaging (CXDI)	\$93656
LB04014	Neuroimaging with Advanced Molecular Probes	\$228425
LB04015	Structural Genomics Tools for Membrane Proteins	\$164728
LB04017	Research and Development for Double Beta Decay Experiments	\$280000
LB04018	Nanoscale Lithography to Guide Self-Assembly for the Creation of Functional, Hierarchical Nanostructures	\$72234
LB04019	Critical Accelerator Technologies for Future Advanced Light Sources	\$786191
LB04020	Extending Electron Delocalization in Mixed-Valent Molecular Assemblies	\$53605
LB04021	Structured Cathodes for Efficient Organic LEDs	\$103973
LB04022	Imaging Three-dimensional Signaling Networks in Normal and Malignant Tissue	\$107702
LB04023	Evaluating Aerosol Effects on Regional and Global Energy and Water Budgets	\$109968
LB04024	Optimizing Genomic Data Storage for Wide Accessibility	\$151574
LB04025	California Water and Energy System: An Approach for Addressing Future Crises	\$239970
LB04026	Making the Most of Sequencing: Improved Assembly, Improved Protocols, and True Comparative Annotation Tools	\$149812
LB04027	Spectroscopy and Dynamics of Pure and Doped Helium Nanodroplets	\$85052
LB04028	Novel High-temperature Membranes and Electrocatalyst Structures for Fuel Cells	\$149853
LB04029	Advanced Computational Methods for Photon- Molecule Collision Processes	\$284070

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LBNL - L. Berkeley National Lab

Project ID	Project Name	FY Total
LB04030	Ultrafast Magnetization Dynamics	\$100500
LB04032	Developing Dynamic Soft X-ray Scattering to Probe Spatial and Temporal Fluctuations in Nanomagnets	\$93154
LB04034	Advancing the Next Generation of Rock-Fluid Imaging and Stimulation Technologies	\$67981
LB04035	Magnetism at the Nanometer Scale in Spin Polarized Materials	\$82825
LB04036	Development of Light-Switchable Potassium Channels	\$71994
LB04037	High Average Power Laser Amplifier	\$446283
LB04038	Gas Phase Studies of the Building Blocks of Life	\$59967
LB04039	Development of Techniques for the Study of Large Macromolecular Complexes Using X-ray Crystallography	\$49354
LB04040	Analysis and Modeling of Multicore Induction Cell Voltage Distribution	\$39987
LB04041	High-throughput Production of Proteins and Protein Complexes	\$120715
LB04042	Development of a Novel DNA/RNA Sequencing Tool	\$49991
LB04043	World Energy Scenarios: The Crucial Role of Energy Demand	\$75000
LB04044	Lensless Imaging of Yeast Cells	\$15058
Total # of Projects for LBNL:	86	Total Cost for LBNL: \$12028553

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LLNL - L. Livermore National Lab

Project ID	Project Name	FY Total
01-ERD-098	Spectroscopy of Shock-Compressed Deuterium	\$115249
01-ERD-101	Stroke Sensor Development using Microdot Array Sensors	\$134467
01-ERD-106	A Hydrophobic Silica Aerogel-Granular Activated Carbon Composite for Removing Arsenic and Hexavalent Chromium from Groundwater	\$81215
02-ERD-002	Single-Cell Proteomics with Ultrahigh-Sensitivity Mass Spectrometry	\$350678
02-ERD-004	Structure and Spectroscopy of Black-Hole Accretion Disks	\$178638
02-ERD-006	Reaching Isochoric States of Matter by Ultrashort-Pulse Proton Heating	\$419505
02-ERD-008	Extremely-High-Bandwidth Diamond Tool Axis for Weapons Physics Target Fabrication	\$363577
02-ERD-010	Ultrasonic Nondestructive Evaluation of Multilayered Structures	\$263131
02-ERD-012	Proton Radiography of Laser-Plasma Interactions with Picosecond Time Resolution	\$109436
02-ERD-013	Dense Plasma Characterization by X-Ray Thomson Scattering	\$166389
02-ERD-014	Nanoscale Fabrication of Mesoscale Objects	\$357993
02-ERD-016	A Three-Dimensional Model of Signaling and Transport Pathways in Epithelial Cells	\$125689
02-ERD-018	Development of Ultrasensitive High-Speed Biological Assays Based on 2-D Flow-Cell Detection of Single Molecules	\$412595
02-ERD-021	Modern Chemistry Techniques Applied to Metal Chelation with Medical and Environmental Applications	\$226444
02-ERD-023	Gaseous Laser Targets and Optical Diagnostics for Studying Compressible Turbulent Hydrodynamics	\$183434
02-ERD-025	The Properties of Actinide Nanostructures	\$408646
02-ERD-027	Local-Scale Atmospheric Reactive-Flow Simulations	\$355142
02-ERD-033	Rapid Resolidification in Metals Using Dynamic Compression	\$325507
02-ERD-035	Remote-Sensing Signatures for Ballistic Target Interceptions	\$385866
02-ERD-040	Development of a Fast Microfluidic Mixer for Studies of Protein Folding Kinetics	\$76149
02-ERD-046	Magnetic Transition Metals and Oxides at High Pressures	\$277874
02-ERD-047	A Revolution in Biological Imaging	\$754931
02-ERD-054	Single-Particle Nanotracking for Genomes-to-Life Applications	\$271495
02-ERD-058	Transport and Biogeochemical Cycling of Iodine-129 from Nuclear Fuel Reprocessing Facilities	\$235634

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LLNL - L. Livermore National Lab

Project ID	Project Name	FY Total
02-ERD-061	Concealed-Threat Detection at Multiple Frames per Second	\$509625
02-ERD-066	Dynamic Simulation Tools for the Analysis and Optimization of Novel Filtration, Sample Collection, and Preparation Systems	\$213429
02-ERD-070	Exploring the Linkage between Impurities and Optical Properties in Rapid Growth of Crystals	\$971679
02-ERD-071	Development of a Quantum-Limited Amplifier using a Direct-Current Superconducting Quantum-Interference Device	\$146330
02-ERI-003	ViSUS: Visualization Streams for Ultimate Scalability	\$378985
02-ERI-004	A Tunable, Monochromatic, 1-Angstrom, Compton Scattering X-Ray Microfocus for Multiwavelength-Anomalous Diffraction Experiments	\$206311
02-ERI-005	Direct Imaging of Warm Extrasolar Planets	\$166987
02-ERI-006	Exchange Coupling in Magnetic Nanoparticles Composites to Enhance Magnetostrictive Properties	\$223961
02-ERI-007	Enabling Large-Scale Data Access	\$253343
02-LW-026	Beta-Decay Experiments and the Unitarity of the Cabibbo-Kobayashi-Maskawa Matrix	\$100000
02-LW-043	The Kinetic Stabilizer: A Route to a Simpler Magnetic Fusion System	\$132582
02-SI-004	Short Pulse: Enabling Relativistic Applications for Advanced Inertial-Confinement Fusion	\$2182634
03-ERD-001	Chemical Dynamics of High-Pressure Interfaces	\$204365
03-ERD-002	Adaptive Optics Views of the Hubble Deep Fields	\$302105
03-ERD-003	Photon Collider Physics	\$237199
03-ERD-004	Quantum Electrodynamics and Electron Collisions in the Superstrong Fields of K-Shell Actinide Ions	\$377181
03-ERD-005	Exploring Properties of Quantum Chromodynamics with Proton-Nucleus and Deuteron-Nucleus Collisions	\$390720
03-ERD-006	Correction of Distributed Optical Aberrations	\$311834
03-ERD-007	Ultrafast Radiation Detection by Modulation of an Optical Probe Beam	\$438782
03-ERD-008	Electron Production and Collective Field Generation in Intense Particle Beams	\$230318
03-ERD-009	A Coupled Turbulence-Transport Model for Edge Plasmas	\$316629
03-ERD-013	DNA Detection through Designed Apertures	\$364249
03-ERD-015	Strain Rate Scaling of Deformation Mechanisms	\$352274

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LLNL - L. Livermore National Lab

Project ID	Project Name	FY Total
03-ERD-017	Phonon Dispersion Curves Determination in delta-Phase Plutonium-Gallium Alloys	\$699464
03-ERD-018	Determination of the Microstructural Morphology of Shock-Induced Melt and Resolidification	\$324852
03-ERD-019	Mononitride Fuel Development for STAR and Space Applications	\$151506
03-ERD-021	Analyzing the Long-Range Transport of Asian Aerosols using an LLNL Atmospheric Model and CAMS/NOAA Measurements from Northern California	\$215731
03-ERD-022	Environmental Fate of Organo-Phosphorus Compounds Related to Chemical Weapons	\$152905
03-ERD-023	Propagation Models for Predicting Communication System Performance in Tunnels, Caves and Urban Canyons	\$39248
03-ERD-024	Microfluidic System for Solution Array-Based Bioassays	\$337783
03-ERD-027	Adaptive Mesh Refinement Algorithms for Parallel Unstructured Finite Element Codes	\$322907
03-ERD-030	Entity-Based Modeling of Population-Based Systems	\$55213
03-ERD-031	Detection and Tracking in Video	\$340454
03-ERD-033	Scalable Discretization-Enhanced Solvers	\$429217
03-ERD-038	An Agent that Can Prohibit Microbial Development and Infection	\$238937
03-ERD-039	Thermally Driven Processes and the Atmospheric Transport and Dispersion of Stable Macroparticles	\$351977
03-ERD-040	Photochromic Radiation Dosimetry	\$332280
03-ERD-042	Predicting the Effects of Climate Change and Variability on Water Availability	\$699758
03-ERD-044	Colliding Nanometer Beams	\$389974
03-ERD-048	Long-Range, Passive Detection of Fissile Material	\$65643
03-ERD-049	Identifying Gene-Regulation Mechanisms using Rule-Based Classifiers	\$49986
03-ERD-050	Carbon-Nanotube Permeable Membranes	\$360523
03-ERD-051	Development of a "Virtual Crystallizer"	\$740075
03-ERD-059	Large-Aperture Diffraction Gratings: The Enabling Technology for High-Energy Petawatt Lasers	\$418012
03-ERD-060	Molecular Engineering of Electrodialysis Membranes	\$894674
03-ERD-061	Parallel Graph Algorithms for Complex Networks	\$418246
03-ERD-062	Microbial Pathways	\$678077

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LLNL - L. Livermore National Lab

Project ID	Project Name	FY Total
03-ERD-063	Protein Model Database	\$409879
03-ERD-064	A Two-Particle Formulation of Electronic Structure	\$177765
03-ERD-065	Environmental Transport and Fate of Endocrine Disruptors From Non-Potable Reuse of Municipal Wastewater	\$283210
03-ERD-067	Nitrate Biogeochemistry and Reactive Transport in California Groundwater	\$958489
03-ERD-068	The Instrumented Cell	\$952319
03-ERD-070	Laser-Matter Interactions with a 527-Nanometer Drive	\$1223339
03-ERD-071	Optics Performance at 1 omega, 2 omega, and 3 omega	\$1029576
03-ERD-072	Characterization and Optimization of High-Energy K-Alpha X-Ray Sources	\$242283
03-ERD-073	A Compact Accelerator for Proton Therapy	\$311978
03-ERD-074	Novel Methods for Bonding Disparate Materials	\$312384
03-ERD-076	Persistent Monitoring Platforms	\$405643
03-ERD-077	Plutonium and Quantum Criticality	\$1077899
03-ERI-001	Tectonic Morphochronology of the Southern San Andreas Fault System	\$239220
03-ERI-002	A Next-Generation Microlensing Survey of the Large Magellanic Cloud	\$90680
03-ERI-003	A Computational Design Tool for Microdevices and Components used in Pathogen Detection Systems	\$277520
03-ERI-004	Elucidation of the Mechanism of Gene Silencing using Small Interfering RNA: DNA Hybrid Molecules	\$75213
03-ERI-005	Cellular Response to Heat Stress: System Stability and Epigenetic Mechanisms	\$62434
03-ERI-007	Development of Sample Handling and Analytical Expertise for the Stardust Comet Sample Return Mission	\$356259
03-ERI-009	Force Spectroscopy to Study Multivalent Binding in Protein-Antibody Interactions	\$84786
03-ERI-010	Intracellular Chemical Measurements: A Generalized Approach with High-Spatial Resolution using Functionalized Nanoparticles	\$82549
03-ERI-011	Single Molecule Techniques for the Study of Chromatin Assembly and Remodeling	\$85057
03-ERI-012	Using Femtosecond Laser Subcellular Surgery as a Tool to Study Cell Biology	\$85068
03-FS-010	Silicon Nanocrystal Laser	\$26650
03-FS-030	Diode Laser Phase Conjugation	\$60138
03-LW-001	A High-Efficiency Grazing Incidence Pumped X-Ray Laser	\$167327

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LLNL - L. Livermore National Lab

Project ID	Project Name	FY Total
03-LW-005	Space-Time Secure Communications for Hostile Environments	\$208766
03-LW-017	Mutations That Cause Human Disease: A Computational-Experimental Approach	\$191192
03-LW-024	Diode-Pumped Alkali Atom Lasers	\$239931
03-LW-027	Long-Time-Scale Atomistic Simulations	\$184646
03-LW-040	Broadband Optical Parametric Amplification in Microstructured Devices	\$172930
03-LW-047	Laser-Initiated Nanoscale Molecularly Imprinted Polymers	\$194008
03-LW-056	Coherent Anti-Stokes Raman Microscopy: Specific Molecular In-Vivo Imaging at Superresolution without Fluorescence Labels	\$73394
03-LW-059	A Novel Antimatter Detector with Application to Dark Matter Searches	\$237201
03-SI-001	Biological and Synthetic Nanostructures Controlled at the Atomistic Level	\$1568312
03-SI-003	ICE: The Image Content Engine	\$1948550
03-SI-004	Advancing the Technology of Tabletop, Mesoscale Nondestructive Characterization	\$606808
03-SI-005	Pathomics	\$3884363
04-ERD-001	DNAPL Dissolution in Porous Media: Multiscale Effects of Multicomponent Dissolution Kinetics on Cleanup Time	\$238265
04-ERD-002	Multiprobe Investigation of Proteomic Structure of Pathogens	\$476993
04-ERD-004	Three-Dimensional Vectorial Time-Domain Computational Photonics	\$299741
04-ERD-005	Infrared Diagnostics for Dynamic Events	\$340997
04-ERD-007	Dynamic Combinatorial Libraries for Target-Driven Ligand Development	\$362845
04-ERD-010	Time-Resolved Dynamic Studies using Short-Pulse X-Ray Radiation	\$442100
04-ERD-012	Locally Adaptive Mesh Refinement for Linear Scaling Electronic Structure Calculations	\$330054
04-ERD-013	Acoustic Characterization of Mesoscale Objects	\$370858
04-ERD-014	Low-Voltage, High-Precision Spatial Light Modulator	\$226818
04-ERD-017	Broadband Radiation and Scattering	\$263905
04-ERD-019	Development of Absolute Spectroscopic Diagnostics for Nonlocal-Thermodynamic-Equilibrium Plasmas	\$230437
04-ERD-020	Electronic Transitions and Phonons in f-Band Metals at High Pressures	\$268771
04-ERD-021	High-Strain-Rate Deformation of Nanocrystalline Metals	\$348698

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LLNL - L. Livermore National Lab

Project ID	Project Name	FY Total
04-ERD-022	Designer Nanocellular Materials for Laser Targets	\$498906
04-ERD-023	Short-Pulse Laser Absorption and Energy Partition at Relativistic Laser Intensities	\$447306
04-ERD-024	XChem	\$257229
04-ERD-025	Ultrafast Transient Recording Enhancements for Optical-Streak Cameras	\$508919
04-ERD-026	Fission Fragment Sputtering	\$159676
04-ERD-027	Magnetic Dynamos and Stars	\$237190
04-ERD-028	The Creation of a Neutron Star Atmosphere	\$381894
04-ERD-030	Electronic Polymerase Chain Reaction	\$153012
04-ERD-032	New Generation X-Ray Optics: Focusing Hard X Rays	\$416328
04-ERD-033	Nanosecond Ultrasonics to Study Phase Transitions in Solid and Liquid Systems at High Pressure and Temperature	\$427206
04-ERD-036	Multiscale Characterization of Body-Centered-Cubic Crystals Deformed to Large Extents of Strain	\$399797
04-ERD-037	Dynamic Data-Driven Event Reconstruction for Atmospheric Releases	\$872314
04-ERD-038	Nonlinear Free-Electron Light Sources	\$400174
04-ERD-039	Bioforensics: Attribution of Biological Weapons Agents by NanoSIMS	\$221028
04-ERD-040	Developing New Tools for In-Vivo Generation and Screening of Cyclic Peptide Libraries	\$385744
04-ERD-042	Modeling the Production of Beta-Delayed Gamma Rays for the Detection of Special Nuclear Materials	\$203731
04-ERD-043	Nanomechanics: Strength and Structure for Nanotechnology	\$205580
04-ERD-046	Coupling Micromechanics and Reactive Fluid Flow in Fracture Networks	\$171807
04-ERD-047	Exfiltration Interdiction Algorithm Development	\$179705
04-ERD-048	High-Average-Power, High-Energy, Short-Pulse Fiber Laser System	\$299641
04-ERD-051	Advancing Climate and Carbon Simulation	\$393177
04-ERD-052	A Coupled Computational and Experimental Approach to Determine Functions of Deeply Conserved "Anonymous" Human Genes	\$496744
04-ERD-053	Metal-Containing Organic and Carbon Aerogels for Hydrogen Storage	\$149441
04-ERD-054	Development and Application of a Predictive Computational Tool for Short-Pulse, High-Intensity Target Interactions	\$456248
04-ERD-057	Surrogate Nuclear Reactions and the Origin of the Heavy Elements	\$269536

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LLNL - L. Livermore National Lab

Project ID	Project Name	FY Total
04-ERD-058	Stellar Astrophysics and a Fundamental Description of Thermonuclear Reactions	\$224835
04-ERD-059	High-Energy-Density Galaxy Jets	\$282970
04-ERD-060	Carbon Sequestration and Transport in Natural Environments, the Role of Organic Carbon and Microbial Processes in the Ocean: Observations and Modeling	\$213194
04-ERD-064	High-Brightness, Laser-Driven, X-Ray Source for Nanoscale Metrology and Femtosecond Dynamics	\$295135
04-ERD-065	Creating the Core Conditions of Extrasolar and Solar Giant Planets in the Laboratory	\$271002
04-ERD-067	Resolution Boosting for Wide-Field and Compact-Snapshot Spectrographs	\$93381
04-ERD-068	Protein Classification Based on Analysis of Local Sequence-Structure Correspondence	\$319643
04-ERD-069	Ionization Chemistry of High-Temperature Molecular Fluids	\$450155
04-ERD-070	The Large Synoptic Survey Telescope and Foundations for Data Exploitation of Petabyte Data Sets	\$364385
04-ERD-071	Ultrafast, In-Situ Probing of Shocked Solids at the Mesoscale and Beyond: A New Paradigm for Materials Dynamics	\$1059768
04-ERD-074	Field Deployable DNA Analyzer	\$150001
04-ERD-075	Hydrogen Absorption in Fluids: An Unexplored Solution for Onboard Hydrogen Storage	\$119773
04-ERD-076	Molecular Radiation Biodosimetry	\$565727
04-ERD-079	Interaction of Viruses with Membranes and Soil Materials	\$134992
04-ERD-080	Quantifying Sea-Level Cosmogenic Neutron/Gamma Backgrounds and Their Effects on Large Volume Sea-Level Detectors	\$74635
04-ERD-082	High Fidelity Fluid Mechanical Model for the Early Time Prediction of Atmospheric Contaminant Clouds From Nuclear Explosions	\$79952
04-ERD-083	Development of Generalized Mapping Tools to Improve Implementation of Data-Driven Computer Simulations	\$111858
04-ERD-084	Characterizing the Regulatory Genome: Transcription Factor Proteins and Gene Regulation Networks in Living Cells	\$492451
04-ERD-085	Is the Island of Stability Centered at Z=114?	\$201659
04-ERD-086	Electro-Thermal-Mechanical Simulation Capability	\$140953
04-ERD-088	A New "Natural Neighbor" Meshless Method for Modeling Extreme Deformations and Failure	\$94720

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LLNL - L. Livermore National Lab

Project ID	Project Name	FY Total
04-ERD-089	High Resolution Aerosol Modeling: Decadal Changes in Radiative Forcing	\$59873
04-ERD-091	Contaminant Uptake and Demography of the Loggerhead Shrike (Lanius Ludovicianus) at the Lawrence Livermore National Laboratory Site 300	\$62675
04-ERD-093	An Integrated Laboratory for the Study of Interventional Device Dynamics	\$211900
04-ERD-095	Internet Ballistics: Supplanting Source IP as the Sole Arbiter of Internet Attribution	\$77638
04-ERD-097	Explosive Particle Imager for Standoff Detection	\$106328
04-ERD-099	Volume Radoptic Detectors	\$100420
04-ERD-101	Investigating the "Trojan Horse" of Yersinia Pestis Virulence	\$199382
04-ERD-102	Petascale Simulation Initiative	\$948909
04-ERD-103	De Novo Identification of Regulatory Regions in Intergenic Spaces of Prokaryotic Genomes	\$111901
04-ERD-104	TOF-SIMS Measurement of Metabolites From Single Cells	\$89390
04-ERD-105	NanoBIS Determination of the Unoccupied Electronic Structure of Pu	\$402314
04-ERD-106	Mapping Phonons at High-Pressure: Phase Transformation, Phase Stability and Elastic Anisotropy	\$109257
04-ERD-107	Nanomaterials for Radiation Detection	\$44180
04-ERD-108	Nonequilibrium Phase Transitions	\$28516
04-ERI-004	Mission to Very Early Earth	\$207649
04-ERI-009	Calcium Dynamics in Human Bone	\$228119
04-ERI-013	Iodine-129 Accelerator Mass Spectrometry for Earth Science, Biomedical, and National Security Applications	\$199390
04-ERI-014	Carbon Flux in a California Grassland Soil Sequence: The Role of Dissolved Organic Carbon in Carbon Sequestration	\$181518
04-ERI-015	Single-Cell Level Investigation of Cytoskeletal Response to External Stimuli	\$83426
04-FS-001	Development of a High-Stiffness Hybrid Passive/Active Magnetic Bearing for Precision Engineering Applications	\$67889
04-FS-004	Ion Mobility Spectrometry	\$60699
04-FS-006	Ceramic Lasers	\$50932
04-FS-007	A Bright Source of High-Energy X Rays	\$74199
04-FS-008	Simulation of Biochemical Pathway Adaptability using Evolutionary Algorithms	\$69881

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LLNL - L. Livermore National Lab

Project ID	Project Name	FY Total
04-FS-009	Development of a Chemoenzymatic-Like and Photoswitchable Method for the Ordered Attachment of Proteins to Surfaces	\$74955
04-FS-010	Prototype Chip Fabrication for Electrochemical Pathogen Detection	\$74848
04-FS-011	Laser Pulse Compression by Stimulated Raman Scattering in a Plasma	\$38240
04-FS-014	Protein-Protein Interaction Mapping of the Human DNA Damage Response Pathway	\$70725
04-FS-015	Rapid Generation of a Nanocrystal-Labeled Peptide Library for Specific Identification of the Bacterium Clostridium Botulinum	\$74834
04-FS-016	Demonstration of Silicon Nanocrystalline Lasers and Amplifiers	\$42892
04-FS-017	Detecting, Locating, and Characterizing Remote Power Sources	\$73832
04-FS-018	Direct Probing of Protein-Protein Interactions	\$74712
04-FS-019	The Innermost Inner Core: Fact Or Artifact?	\$50388
04-FS-020	Small Sample Heat Capacity Under High Pressure	\$47592
04-FS-021	Cell-Type-Specific Genome-Wide Expression Profiling After Laser Capture Microdissection of Living Tissue	\$72417
04-FS-023	Feasibility of Space-Based Seismometry Utilizing a Satellite-Borne Real Aperture Radar	\$49036
04-FS-029	Constraints on Strong Earthquake Ground Motion From Nuclear Explosion Data	\$36138
04-FS-031	Geophysics Experiments on High-Powered Lasers	\$40645
04-FS-032	Two-Phase Noble Liquid-Gas Detectors for Detection of Coherent Elastic Neutrino Scattering	\$45728
04-FS-034	Microfluidic Liquid Cell for Molecular Imaging in Aqueous Phase Using Atomic Force Microscopy	\$41412
04-LW-008	Biomechanics of Spinal Fracture	\$150298
04-LW-017	Development of Insulating Liquids for Detecting and Imaging of Low-Energy Particles	\$138538
04-LW-020	Relativistic Antimatter Plasmas Created by Ultra-Intense Lasers	\$175479
04-LW-031	Generation and Advanced Diagnosis of Femtosecond, High-Brightness Electron Beams	\$156065
04-LW-036	Fractality of Fracture Surfaces in Polycrystalline Materials	\$128548
04-LW-048	Understanding the Mechanism of Human P450 CYP1A2 using Coupled Quantum-Classical Simulations in a Dynamical Environment	\$157386

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

LLNL - L. Livermore National Lab

Project ID	Project Name	FY Total
04-LW-049	Investigation of AAA+ Protein Machines That Participate in DNA Replication, Recombination, and Response to DNA Damage	\$177315
04-LW-054	New-Shape Memory Polymers for Actuators	\$164032
04-LW-062	Renewable Reflective Optics Based on Thermolelastic Effects: Concept and Design Equations	\$57966
04-LW-065	Application of Light-Emitting Polymers to Detect Pathogen DNA in Blood	\$189579
04-LW-069	A Single Molecule Study of the Movement of a DNA Sliding Clamp	\$189884
04-LW-077	Constraints on the Nature of Terrestrial Core-Forming Melts: Ultrahigh-Pressure Transport Property Measurements and X-Ray Computed Tomography	\$173856
04-SI-003	Kinetic Simulation of Boundary-Plasma Turbulent Transport	\$1021207
Total # of Projects for LLNL:	220	Total Cost for LLNL: \$68985350 *

*Does not include \$811,354 of administrative and related implementation costs.

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

NTS - Nevada Test Site

Project ID	Project Name	FY Total
H1701024	Bessel Probe	\$18596
H1701043	Framing Tube Design & Fabrication	\$18821
H1701044	High Speed 8 Channel Micro Digitizer	\$133509
H1701064	Raman Velocimetry Diagnostic	\$14909
H1701074	Laser Multi pulsed X Ray Generator	\$163298
H1701084	Digital Streak Camera	\$140237
H1701094	XML for Instrumentation	\$125480
H1701134	Compact Modular Marx for a Portable Flash X Ray Source	\$29882
H1701144	1 Gigasample Per Second Remote Digitizer	\$56810
H1701154	Development of a Multichannel Velocity Interferometer Optical Dome	\$54318
H1701164	Digital Framing Camera	\$111923
H1702014	40mm Image Converter	\$186611
H1702034	Picosecond Avalanche Pulsers	\$107208
H1702044	Capacitive Divider	\$29491
H1702073	Low Energy X Ray Radiographic Sources	\$1118
H1702104	High-Power Pulser	\$96070
H1702124	Low Voltage High Speed Streak Tube	\$36644
H1702134	Streak Camera Micro controller system	\$193311
H1702184	Ultrahigh Speed Long Data Length Transient Recorder	\$68160
H1703013	Tailored Neutron Source	\$23946
H1703014	MARXT Test Stand	\$69687
H1703033	Particle Discriminating Activation Detector	\$29654
H1703054	Two Bank DPFA	\$367074
H1703064	Associated particle neutron calibration facility	\$117145
H1703094	High Volume Anode (Optimized Geometry HOT tube)	\$87719
H1703104	High Output Tube	\$132269
H1703114	Sum Peak Counting of Short Lived Activation Product	\$50661
H1703124	ZnS Based Neutron Spectrometer	\$81918
H1703134	Compact Fabry Perot Development	\$196831

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

NTS - Nevada Test Site

Project ID	Project Name	FY Total
H1704014	Study of LaBr3 as a high resolution room temperature spectroscopy	\$51710
H1704023	Real Time Photogrammatic Map	\$20341
H1704114	Evaluation of Region of Interest Based Search using an HPGe Detector	\$13469
H1704194	Temperature Measurement of Thermal Hot Spots Using SWIR Channels	\$46982
H1704203	Li6(Ce) Glass Fiber Detectors	\$7757
H1704214	Micro-machine distributed detectors	\$77738
H1704234	Micro Portal Radiation Monitor	\$46126
H1704244	MCNP Phantom Library	\$82694
H1704264	Application of Direction Detection Techniques to Generic Detectors	\$28733
H1704304	Dual Temperature Emissivity Study	\$3705
H1704353	RF Detection of High Explosive Materials	\$22703
H1704374	Portable long standoff antenna for communications and detection system applications	\$77301
H1704414	Micro machine distributed detectors	\$54625
H1704454	Design parameter Optimization of a 2D Gamma neutron Detector	\$29763
H1704504	LiDAR Experiment for City Models	\$113771
H1704514	One Path Photogrammetric Program for a Digital Frame Camera	\$143922
H1704554	Large Area Neutron Detector	\$76179
H1704584	An Investigation of Data Compression and Satellite Transmission Techniques for Aerial Measurement	\$85592
H1705014	Micro machine distributed detectors	\$168009
H1705024	Optical Diagnostics for Phase Changes in Metals	\$132090
H1705034	Covariance Mapping	\$8023
H1705044	Compact Penning Mass Spectrometer	\$73540
H1705064	Solid State Ultraviolet Laser Diode	\$86100
H1705074	Holographic visualization of dynamic processes	\$81363
H1705154	Fast GC Chemical Biological (CB) Evaluations	\$80837
H1705184	Lithium Niobate Terahertz Generator	\$253636
H1705234	Ultra Low Power High Voltage Power Supply	\$105805
H1705254	Flexible Short range Communications Network	\$62460

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

NTS - Nevada Test Site

Project ID	Project Name	FY Total
H1705264	Bone Dry	\$87623
H1705273	Handheld direct Thermal Imager	\$29700
H1705284	Pulsed Nd YAG Ring Laser	\$62866
H1705294	Fourier Transform IR Improvements	\$39615
H1705304	Cathodoluminescence and SEM EDS Analysis of Fissionable Dust Particles for Nuclear Nonproliferation and Environmental Assessment	\$67859
Total # of Projects for NTS: 62		Total Cost for NTS: \$5065937 *

*Does not include \$413,270 of administrative and related implementation costs.

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ORNL - Oak Ridge National Lab

Project ID	Project Name	FY Total
3210-2057	Nanoelectronic Devices Made from Doped Nanofibers	\$14926
3210-2065	Novel Platinum Support for Proton-Exchange-Membrane Fuel-Cell Cathode and Anode Active Layer	\$29632
3210-2067	Nanocrystalline Giant Magnetostrictive Materials for Microactuator Applications	\$59952
3210-2069	Development of a New High-Temperature Proton-Electron Mixed Conductor for Hydrogen Separation	\$18851
3210-2074	Selective Area Chemical Vapor Deposition of Carbon Nanotube Films Using Seeded Molecular Beams	\$59989
3210-2076	Permeable Environmental Leaching Capsules for Nondestructive In Situ Evaluation of Contaminant-Immobilization Techniques in Soil	\$38994
3210-2077	High-Tc Silicon-Compatible Ferromagnetic Semiconductors	\$32051
3210-2078	Development of Readout Electronics Architecture for a Silicon-Strip Vertex Detector Upgrade to the PHENIX Experiment	\$31987
3210-2079	Controlling Size and Function of Metal Oxide Nanoparticles: Coupling Micellar Nanoreactor Synthesis and Hydothermal Processing	\$41446
3210-2081	An Innovative Technique for Bimaterial Interface Toughness Research	\$79682
3210-2083	Nanoporous Inorganic Membranes for High Selectivity Hydrogen Separations	\$34385
3210-2084	High-Aspect-Ratio Carbon Nanofiber Probes for Scanning Probe Microscopy	\$59562
3210-2085	Construction of a Gene-Prediction Algorithm in Populus: Adding a New Dimension to Complex Biology	\$58873
3210-2087	In Situ Studies of Hydrogen Storage Materials Using Neutron Scattering	\$98451
3210-2088	Toward Neutron Star Merger Simulations: Gravitational Waves, Heavy Element Nucleosynthesis, and Gamma-Ray Bursts	\$74196
3210-2091	Development of a Three-Dimensional Radioisotope Depletion Method Using Monte Carlo Transport	\$62895
3210-2092	Zero-Loss Fiber Optic Splitter	\$69954
3210-2093	Alkanates for High-Capacity Hydrogen Storage	\$90141
3210-2094	The Global Optimization Problem for Remote Sensing: A Guaranteed Efficient Solution	\$95000
3210-2095	High-Speed Decay Lifetime Analysis Using Field-Programmable Gate Arrays	\$2132
3210-2096	Sounds of Rapids as an Attractant for Migratory Fish	\$60239
3210-2099	High Effective Hydrogen Storage Density	\$112244

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ORNL - Oak Ridge National Lab

Project ID	Project Name	FY Total
3210-2100	Metallic Nanofuels for Vehicles	\$52458
3210-2101	Enhancing Storage of Hydrogen-Storage Materials Through Nanoscale Design	\$40517
3210-2102	Development of a Novel Method for Rapid Cellular Material Extraction and Separation in Air	\$88635
3210-2103	Advanced Diagnostics Algorithm for Cancer Detection Using Hyperspectral Fluorescence Imaging	\$84750
3210-2104	Development of Novel Technology to Synchronize Pulsed, Broad-Area, Semiconductor Lasers	\$124993
3210-2105	A Short Cut to Making Mouse Models for Stressor Resistance for Application to Longevity (Aging) and Other Exposure-Biology Research	\$74949
3210-2106	Development of a Preamplifier for an Imaging Gamma-Ray Detector	\$64599
3210-2107	Selectively Enhanced Adatom Diffusion	\$66929
3210-2108	Biocatalytic Desaturation and Oxidation: A Technology with Multiple Applications	\$72971
3210-2109	Environmental Isotope Forensics of Perchlorate Contamination	\$109928
3210-2110	Superionic Electrolyte-Based Fuel Cell Concept for Portable Multifuel Power Sources	\$124743
3210-2111	Super-Hydrophobic Nanopost Glass	\$164744
3210-2112	Hydrogen Production from Naturally Occurring Iron Silicates	\$80043
3210-2113	Cyclopentadienyl Iron Clusters as Nanoscale Building Blocks for Multi-Electron Electrocatalysis	\$87946
3210-2114	Development of a Position-Sensitive Neutron Detector for Use at the High Flux Source Facilities: SNS and HFIR	\$71855
3210-2115	Development of the "Ultimate" Scanning Tunneling Microscope for the Center for Nanophase Materials Science	\$82977
3210-2116	Real Space Imaging of High Frequency Transport on the Nanoscale	\$67857
3210-2117	Novel, Tunable, Ultrafast, Nonlinear Optical Switching	\$49890
3210-2118	Development of a High-Throughput, Laser-Based Technique for Quantifying the Elemental Composition of Wood: Applications in the Forest Products Industry	\$42268
3210-2119	Optically Manipulated Microelectronics Artificial Retina	\$49918
3210-2120	Mesosopic Fluidic-Based Actuators	\$93898
3210-2121	Creation of Switchable Photosystem II Designer Alga for Hydrogen Production	\$22413

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ORNL - Oak Ridge National Lab

Project ID	Project Name	FY Total
3210-2122	Development of a Multimode and Multispectral Automated Mueller Matrix Polarization Imaging System of Noninvasive Detection and Diagnosis of Skin Cancer	\$62554
3210-2123	Design and Synthesis of Oriented Guest-Host Nanostructures for Enhanced Membrane Performance	\$48470
3210-2124	A Hybrid Solid-State Process for Joining High-Temperature Materials	\$49927
3210-2125	Alkali Silicate and Related Glasses and Novel Hydrogen Storage Materials	\$59809
3210-2126	Development of an Innovative Triboluminescence Approach for Low- and Hypervelocity Impact Damage Sensing	\$19777
3210-2127	An Energy Efficient Method for Semi-Solid Material Processing	\$65772
3210-2128	Using Live-Cell Imaging Technologies to Probe Molecular Interactions Between Bacterial Cells and Heavy Metals	\$20362
3210-2129	Development of a Rich-Air/Fuel-Ratio Sensor Correction System	\$19623
3210-2130	An Image-Based Method for Screening and Diagnosis of Blinding Eye Disease	\$37953
3210-2131	Direct Band Gap Semiconductors on Silicon for Solid State Lighting: Silicon-Based, Blue-Light Emitting Diodes	\$79096
3210-2132	Biaxial Flexure Tests of Multilayers	\$19814
3210-2133	Development of New Nanoparticle-Strengthened Ferritic and Martensitic Steels by Thermomechanical Treatment	\$17568
3210-2134	Minimum Required Migration Distances--A New Tool for Estimating Climate Change Impacts	\$19962
3210-2135	Novel Technologies for Wide-Scale Production of Magnesium and Hydrogen	\$60125
3210-2136	Measurement of Species Distributions in Operating Fuel Cells	\$19972
3211-2035	Enhanced Performance and Energy Savings Through Ultrahigh Magnetic Field Processing of Ferromagnetic Materials	\$99946
3211-2045	Detector Development for Fundamental Neutron Physics at the Spallation Neutron Source	\$236323
3211-2046	Three-Dimensional Neutron Structural Microscopy: Design and Demonstration	\$14848
3211-2057	Neutron-Rich Radioactive Ion Beam Production with High-Power Electron Beams	\$139639
3211-2058	Scaling Climate Models for Future Computer Architectures	\$318618
3211-2059	Advanced Computational Methods	\$325756
3211-2060	Genomic Characterization of Belowground Ecosystem Responses to Climate Change	\$293771

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ORNL - Oak Ridge National Lab

Project ID	Project Name	FY Total
3211-2061	Self-Organizing Polymers as Biomaterials	\$236305
3211-2062	Materials Science of Nanostructured Carbons and Graphites	\$243097
3211-2063	Aberration-Corrected, Ultrahigh-Resolution Electron Microscopy for Atomic-Level Characterization of the Structure and Chemistry of Nanophase Materials	\$239560
3211-2064	Biologically Driven Controlled Synthesis and Directed Assembly of Nanophase Inorganic Materials	\$273719
3211-2065	Creating New Climate Drivers and Interactions in Global Climate Models	\$300305
3211-2066	Biomolecular "Locks and Keys:" High-Performance Computing for Investigation of Recognition Principles in the Complexes of Biological Macromolecules	\$228736
3211-2067	Toward Common Components for Computational Nanoscience	\$249972
3211-2068	Comprehensive Molecular Probing of Live Biological Cells	\$149999
3211-2070	Zero-Net Power, Low-Cost Sensor Platform	\$260555
3211-2071	Intelligent Consequence Management for Energy Assurance	\$204962
3211-2072	Breakthrough Multi-Megawatt Space Reactor Power System Design	\$294305
3211-2073	Distributed Intrusion Detection and Attack Containment for Organizational Cyber Security	\$219575
3211-2074	Image to Intelligence Archive: Intelligent Agent-Based, Large-Scale, Spatial-Data Management and Analysis	\$306440
3211-2075	Advanced Ion Trap Mass Spectrometry for the Rapid and Confident Identification of Biological Agents	\$300988
3211-2076	NEUTROMEGAS: A Pixel Detector for Neutron Imaging	\$239604
3211-2077	Nanoscale Control of Collective Phenomena Using Artificially Structured Materials	\$44934
3211-2079	Materials Needs for Successful Implementation of Lean NOX Treatment Technology	\$149858
3211-2080	Production of Hydrogen Using Nuclear Energy and Inorganic Membranes	\$249981
3211-2081	Probing Explosive Nucleosynthesis Through Measurements at the Holifield Radioactive Ion Beam Facility	\$147536
3211-2082	Nano/Micro Systems for Advanced Neuronal Interfacing	\$199848
3211-2083	Nanorods for Energy and Photonics	\$218651
3211-2084	A Revolutionary Infrared Nanoscale Processing Approach	\$191393

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ORNL - Oak Ridge National Lab

Project ID	Project Name	FY Total
3211-2085	Artificial Cellular Receptors: Interfacing Nanostructured Hard and Soft Materials	\$263376
3211-2086	Profiling Spin Injection at the Atomic Scale	\$229918
3211-2087	Comprehensive Fusion Simulation: Component-Based Software Engineering and Evolutionary Time Advancement	\$369704
3211-2088	Bringing Statistical Visualization to the Terascale and Beyond: Visual Analysis in Full Context	\$249595
3211-2089	Nanochemistry: The Bridge from Materials to Biological Sciences	\$250052
3211-2090	Characterizing the Complex Metaproteomes of Microbial Communities	\$147745
3211-2091	Comprehensive Analysis of Microbial Proteomes Using Signature Peptides	\$174899
3211-2092	Building ORNL's Capabilities for Genome-Scale Quantitative Measurements of Protein Complexes	\$193637
3211-2093	Exploring New Methodologies in Detecting Low Abundance Protein Complexes	\$240637
3211-2094	Flameless Combustion Engines in the Transition to Hydrogen	\$226808
3211-2095	Assuring the Communications Infrastructure for the Electric Grid of the Future	\$247193
3211-2096	Boron-Nitrogen Polymers/Boron Nitride System For Hydrogen Storage	\$59335
3211-2097	Advanced Processes for Nuclear Fuel Microspheres	\$258449
3211-2098	Genetic Variability in Host Responses to Bioterror Agents	\$238113
3211-2099	Complex Oxides with Frustrated Orbital Ordering	\$199850
3211-2100	H- Laser Stripping Proof-of-Principle Experiment for the Spallation Neutron Source Power Upgrade Proposal	\$307049
3211-2101	Development of In-Situ Neutron Diffraction Capabilities for Studies of Deformation and Fracture Behavior under Hydrogen-Rich Environments	\$198708
3211-2102	Quantum Circuit Modeling for Nanoelectronics	\$197650
3211-2103	High-Throughput Biological Data Analysis and Modeling Tools for Genomes to Life Facilities	\$175042
3211-2104	Cross-Cutting Data and Tools Infrastructure for Genomes to Life Facilities	\$197438
3211-2105	Exploratory Computational Biology for Genomes to Life Facility III	\$199922
3211-2106	Characterization of Spin Structure and Spin Dynamics of Nanostructure Assemblies Using In-Field Scanning Electron Microscopy with Polarization Analysis	\$11998
3211-2109	Information Analysis and Fusion for Threat-Vulnerability Analysis	\$100000
3211-2110	Advanced Plasmonic Sensor Array for Homeland Security	\$99587

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

ORNL - Oak Ridge National Lab

Project ID	Project Name	FY Total
3211-2111	A Neutron Science Portal Infrastructure to Facilitate Remote Access to Spallation Neutron Source Data and Computation	\$199971
3211-2112	Photonic Bandgap Crystal Sensor	\$71745
3211-2113	Redefining ORNL's Suite of Protein Analysis Technologies by Adding Flexibility, Analytical Capacity, and Biological Utility	\$52497
3211-2114	Research and Development for Neutron Structural Biology and Soft-Matter Science	\$146384
Total # of Projects for ORNL:	116	Total Cost for ORNL: \$15232173 *

*Does not include \$86,295 of administrative and related implementation costs.

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

PNNL - Pacific Northwest National Lab

Project ID	Project Name	FY Total
PN02001/1589	A Protein Functional Analysis Platform for Information Integration	\$149681
PN02002/1590	Actinide Coordination Chemistry for Advanced Separations Technology	\$81678
PN02004/1592	Advanced Meteorological Modeling for Applied Dispersion Models	\$29998
PN02005/1593	Advanced Simulation Software for Subsurface Science	\$240412
PN02013/1601	Characterization of Shewanella oneidensis MR-1 Genes Involved in Environmental and Cell-Cell Sensing	\$270452
PN02015/1603	Computational Cell Environment	\$271827
PN02016/1604	Design and Simulation of the Future Integrated Energy System	\$200763
PN02021/1609	Development of Damage and Optimization Tools for the Design of Short-Fiber Thermoplastic Hybrid Composite Structures	\$225578
PN02022/1610	Development of Data Mining Capabilities for Proteome-Wide Analyses	\$180052
PN02033/1621	Filamentous Fungal Genetics	\$198864
PN02035/1623	Disposal of CO2 in Sedimentary Formations	\$186815
PN02039/1627	Kinetic Simulations and Network Analysis: The EGF Receptor Signaling Network	\$138049
PN02044/1632	Nondestructive Characterization of Life-Limiting Degradation of Nuclear Power Plants	\$53758
PN02051/1639	Proteomics of Morphology Determination in a Fungus	\$27790
PN02053/1641	Quantum Calculations for Systems With 104-105 Atoms: Application to Nano-Materials and Biochemical Reactivity	\$118910
PN02062/1650	Simulation Methodology Development for an Energy Transmission and Distribution System	\$47887
PN02063/1651	Single Chain Monoclonal Antibodies (scFv): A Versatile Source of Antigen Specific Reagents	\$199734
PN02064/1652	Single-Molecule Approach for Understanding EGF Receptor Interactions	\$253419
PN02069/1657	Synthesis Techniques and Characterization of Nanostructured Organic-Inorganic Hybrid Systems	\$188842
PN02075/1663	Yttrium-90 Fibrin Composites for Treating Minimum Residual Disease	\$70283
PN03002/1665	A Scalable Architecture for Content-Based Information Discovery	\$119927
PN03003/1666	Adaptive Data Integration Middleware for Dynamic Information Discovery	\$129380

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

PNNL - Pacific Northwest National Lab

Project ID	Project Name	FY Total
PN03004/1667	Advanced Information Analysis and Processing	\$129335
PN03005/1668	Advanced Radiochemical Analyses	\$165091
PN03007/1670	Affinity Reagents for Surface Functionalization	\$91208
PN03012/1675	Brazing Techniques for Dense High Fired Alumina Ceramics	\$49746
PN03014/1677	Climate-Change Chemistry of Atmospheric Particles	\$79957
PN03015/1678	Communications Analysis	\$46397
PN03017/1680	Concept-Based Document Analysis: Human-Centered Information Discovery	\$102847
PN03018/1681	Cooperative Multi-Agent System for Data Mining and Fusion	\$109980
PN03019/1682	Data Anomaly and Signature Detection with Associated Data Utility Development	\$74388
PN03020/1683	DC-STREAMS: Detecting Change in Continuous, Time-Varying Data Streams	\$49999
PN03021/1684	Detection of Chemical Signatures in Rivers and Coastal Environments Using Bivalves	\$108159
PN03024/1687	Development of a Salmonid Based DNA Microarray for Toxicological Testing of Environmental Contaminants	\$145026
PN03026/1689	DNA Microarrays for Monitoring Chemically-Induced Stress in Chironomus tentans	\$67806
PN03028/1691	Electrode Structures for High Pressure Xenon Detectors	\$65811
PN03029/1692	Electronic Structure of Organic Light Emitting Diode Materials	\$89815
PN03030/1693	Elucidating Cell Signaling Networks in Shewanella Oneidensis MR-1	\$170448
PN03034/1697	Framework for Climate Modeling Using Superparameterization Techniques	\$242834
PN03037/1700	Heuristic Entity Relationship Building Environment	\$242876
PN03039/1702	Highly Selective Monolayer Sorbents for Advanced Analytical Applications	\$218897
PN03040/1703	High-Speed Three-Dimensional Visualization of Intercellular and Intracellular Signal Transduction in Complex Cell Structures	\$268489
PN03042/1705	Hydrogen Storage Concepts	\$98300
PN03043/1706	Identification and Analysis of Hidden Multi-Relational Links	\$49232
PN03044/1707	Implementation of Parallel Solver in Coupled Fluid, Energy, and Solute Transport Computer Code (CFEST)	\$46690
PN03045/1708	Imprinted Media for Highly Selective Separation of Explosives, Chemical Warfare Agents and Biological Warfare Surrogate Organisms	\$139120

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

PNNL - Pacific Northwest National Lab

Project ID	Project Name	FY Total
PN03046/1709	In Situ Magnetic Resonance Investigations of Metabolism and Mass Transport in Biofilms	\$201968
PN03047/1710	In Situ Spatial Analysis of Expression in Bioreactor Granule Microbial Communities	\$154073
PN03048/1711	Influence of Gd and Sm Doping on Atomic and Ionic Transport Properties of Novel Nanostructured Ceria-Zirconia Multilayers	\$185889
PN03049/1712	Influence of Surface Thermodynamic Properties on Bacterial Transport in Variably Saturated Porous Media	\$26026
PN03052/1715	Knowledge Signatures for Integrated Information Management	\$188408
PN03053/1716	Life-Limiting Degradation Mechanisms in Current Light-Water and Advanced Concept Reactors	\$54985
PN03055/1718	Modeling Power Systems as Complex Adaptive Systems	\$200720
PN03056/1719	Multilayer Thin Film Separation Membranes	\$20020
PN03057/1720	Multiple Sensor Data Integration and Decision Analysis - Chemical Signature Detection	\$73741
PN03058/1721	Multiple Sensor Data Integration and Decision Analysis -- Nuclear Signature Detection	\$42045
PN03060/1723	Neutron Scattering to Determine Biomolecular Conformations on Biosensor Surfaces	\$48321
PN03063/1726	New Thin-Film Electroactive Materials for Enhanced Separations	\$70948
PN03067/1730	Novel Near-Infrared Laser Absorption Spectrometer Development	\$105548
PN03068/1731	On-line Measurement of Particulate Organics in Diesel Exhaust by Chemical Ionization Mass Spectrometry	\$89792
PN03070/1733	Organic Synthesis Using Plasma-Facilitated Catalysis	\$85102
PN03073/1736	Peptide Permutation and Protein Prediction	\$234615
PN03075/1738	Preconcentration of Organic Signatures Based on Carbon Nanotube Composites	\$185141
PN03078/1741	Real-Time Detection and Multidimensional Characterization of Single Air-Borne Microorganisms	\$105915
PN03079/1742	Regenerable Sorbents for Carbon Dioxide Capture Based on Functionalized Nanomaterials	\$208438
PN03081/1744	Scenario and Knowledge Framework for Analytical Modeling	\$255644

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

PNNL - Pacific Northwest National Lab

Project ID	Project Name	FY Total
PN03082/1745	Sensor and Tracer Technology for Characterization of Ultra-Low CO2 Leakage Fluxes and Pathways	\$124957
PN03083/1746	Single Enzyme Nanoparticles on Nanostructured Matrices	\$240076
PN03085/1748	Sonoluminescence Following Acoustically Driven Bubble Collapse	\$123715
PN03086/1749	Stress-Activated Control Mechanisms Underlying Signal Transduction Networks	\$390346
PN03088/1751	Supercritical Fluid Extraction of Bacterial Spores and Analysis for Specific Biomarkers	\$91154
PN03089/1752	Surface Functionalization for Biorecognition	\$89687
PN03090/1753	Synthesis and Characterization of Novel Nanoporous Transition Metal Phosphates with Inherently High Anion Adsorption Properties	\$50949
PN03092/1755	Transcriptional Profiling of Microbial Syntrophic Systems	\$334795
PN03095/1758	Using High Frequency Pulsed Ultrasound at Sub-Cavitation Conditions as a Mechanism to Enhance Energy Efficiency and Selectivity in Heterogeneous Catalytic Chemistry	\$65975
PN03096/1759	Validation of scFv Antibodies for Identification of Protein Complexes	\$125660
PN04001/1760	A Toxicogenomic Approach for Quantitative Structural Activity Relationship Modeling.	\$27000
PN04002/1761	Active Disk For Proteomics	\$50002
PN04003/1762	Advanced Materials for Preconcentration and Sensing	\$122029
PN04004/1763	Aftertreatment Systems Effectiveness	\$94948
PN04005/1764	Aquatic Multisensor Measurement	\$199482
PN04006/1765	Array Technology for Quantification of Proteins	\$160755
PN04007/1766	Atomistic Modeling of Defects and Transport Processes in Oxides	\$69129
PN04008/1767	Background Characterization and Sensitivity Analysis for Detection of Threats to Marine and Freshwater Environments	\$79777
PN04009/1768	Biological Data Fusion and Visualization	\$138897
PN04010/1769	Biological Markers in Nasal Secretion: An Application of Proteomics for Human Health Risk Assessment	\$49924
PN04011/1770	Building-Wake Feasibility Study	\$14692
PN04012/1771	Chalcogenide Nanowire Synthesis, Mechanisms, and Applications	\$49990

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

PNNL - Pacific Northwest National Lab

Project ID	Project Name	FY Total
PN04013/1772	Chemically and Mechanically Stable Bipolar Membranes for Electrodialytic Desalination	\$22994
PN04014/1773	Chemostat Research Using Filamentous Fungi	\$174976
PN04015/1774	Class-Based Atmospheric States Mapping	\$24945
PN04016/1775	Community Data Sharing and Collaboratories for Biological Sciences	\$74630
PN04017/1776	Complex Adaptive Transactive Systems: Design and Operation	\$90327
PN04018/1777	Concurrent Single-Program-Multiple-Data (SPMD) Tasking in Global Arrays and its Application to Electronic Structure Calculations on Systems with Thousands of Processors	\$223642
PN04019/1778	Conversion of Grain Lipid Components to Chemicals	\$45992
PN04020/1779	Coupled Proton-Electron Dynamics in Iron Containing Phyllosilicates: An Experimental and Theoretical Investigation Using Neutron Scattering	\$89873
PN04022/1781	Decontamination of Building Material Using Complexant-Modified Strippable Paint	\$49832
PN04023/1782	Design and Demonstration of Integrated Biologically Based Risk Modeling Framework	\$124970
PN04024/1783	Development of a Novel Approach for Imaging Inhaled Particulates	\$113506
PN04025/1784	Development of High-Throughput Global Metabolomics Approaches Based on Mass Spectrometry	\$160067
PN04026/1785	Development of Spatially Resolved Proton Transfer Reaction-Mass Spectrometry for Characterization of Hydrocarbon Distributions in Monolithic Catalysts and Microreactors	\$69999
PN04027/1786	Ecological Sensors Using Enzymes Immobilized in Functionalized Nanoporous Silica Chips	\$81691
PN04028/1787	Electronically Excited States in Amorphous Solid Water	\$94975
PN04029/1788	Establishing a Direct Link between Aerosol Chemical Properties and Clear Sky Aerosol Radiative Forcing	\$74081
PN04030/1789	Evaluation of Engineered Vadose Zone Bioremediation vs. Natural Attenuation	\$50015
PN04031/1790	Fast, Two-Dimensional Gas-Phase Separations for Ultrahigh-Throughput Global Analyses	\$99959
PN04032/1791	Identification of Particles by Surface-Enhanced Raman Scattering Spectroscopy	\$23047
PN04033/1792	Information Fusion for Structured Guided Analyses	\$281753
PN04034/1793	Integrated Data Structures for Mapping Cellular Networks	\$356613

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

PNNL - Pacific Northwest National Lab

Project ID	Project Name	FY Total
PN04035/1794	Integrated Demonstrations of Threat Detection and Early Warning Systems	\$328329
PN04036/1795	Integrated Multimedia Modeling	\$47317
PN04037/1796	Kinetics of Carbonate Mineralization Using In Situ X-Ray Diffraction	\$44949
PN04038/1797	Knowledge Management for Intelligence Analysis	\$56827
PN04039/1798	Maritime Microlayer Sampler: Radionuclide Identification and Quantification	\$73627
PN04040/1799	Mechanisms of Regulated Ligand Shedding	\$218357
PN04041/1800	Medium Curie Saltcake-Fractional Crystallization with Displacement Washing for Hanford Tank Waste Supplemental Pretreatment	\$46832
PN04042/1801	Microcantilever-Based Sensing	\$97289
PN04043/1802	Modeling Indirect Aerosol Effect on Cloud Scale	\$65042
PN04044/1803	Nanoparticle-Enhanced Pathogen Detection	\$68540
PN04045/1804	Nanophase Materials and Catalysts for Hydrogen Storage	\$259497
PN04046/1805	Natural Fiber Surface Modification	\$34803
PN04047/1806	Network Inference Testbed	\$100522
PN04048/1807	Next-Generation Chemistry-Aerosol-Meteorology Model for Addressing Climate Change and Air Quality Interactions	\$249827
PN04049/1808	Novel Structured Monolith Reactors for Gas-Liquid-Solid Reactions	\$35069
PN04050/1809	On-Demand Neutron Source	\$14469
PN04051/1810	Projection Methods for Multiscale Modeling of Materials	\$45323
PN04052/1811	Protein Cross-Linking in Solid State Designated for Identification and Characterization of Intact Protein Complexes	\$144972
PN04053/1812	Proteome and Bioenergetic Analysis of Growth States in a Syntrophic Co-Culture	\$265347
PN04054/1813	Proteomics of Filamentous Fungi	\$184802
PN04055/1814	Proteomics of Membrane Protein Complexes: Relating Calcium Signaling and Oxidative Stress	\$196373
PN04056/1815	Quantifying Uncertainty in Complex Scientific Simulations Using Iterative, Adaptive Response Modeling (Beyond Monte Carlo)	\$251454
PN04057/1816	Research into the Causes of Independent Component Analysis Selectivity	\$90428

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

PNNL - Pacific Northwest National Lab

Project ID	Project Name	FY Total
PN04058/1817	Saliva as a Non-Invasive Biomonitoring Matrix for Determination of Exposure to Chemical and Biological Agents	\$118784
PN04059/1818	Selective Inhibition of Gene Function in Cells	\$156282
PN04060/1819	Small Metabolite Imaging	\$131442
PN04061/1820	Spatial and Temporal Characterizations of Single-Enzyme Catalysis Under Nanoscale Confinements	\$219669
PN04062/1821	Statistically Rigorous Quality Control for Proteome Analysis	\$139386
PN04063/1822	Stimulus Controlled Catalysis	\$99989
PN04064/1823	Structural Characterization of Molecular Machines	\$79644
PN04065/1824	Synchrotron X-ray Spectroscopy of Novel Organic Diphosphine Light-Emitting Materials	\$79932
PN04066/1825	Synthesis and Characterization of Novel Oxides for Spintronics and Catalysis	\$114821
PN04067/1826	Template Synthesis of Highly Nanocrystalline SiC with High Surface Area	\$89735
PN04068/1827	Toxicoproteomics-Based Core Analytic Capability for Chemical Toxicology and Environmental Sentinel Studies	\$200922
PN04069/1828	Transmodulation of Cell Responses in Epithelial Cells	\$146578
Total # of Projects for PNNL:	144	Total Cost for PNNL: \$18292894

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

PTX - Pantex Plant

Project ID	Project Name	FY Total
PX01001	Proximity Tracking Capability	\$1
PX01009	Circuitry Analysis to Produce Work Area Voltage Profiles Generated by Lightning Flashes	\$29000
PX01015	Explosive Synthesis & Formulation Process Optimization by Computer Modeling	\$91509
PX02003	Establish a Computational Capability at Pantex for Modeling Organic Compounds for Stockpile High Explosives and Design Agency Research Explosives	\$12614
PX02011	3D Acoustical Resonance System	\$36241
PX02015	Development and Implementation of an Enhanced Chemical Reactivity Test	\$40497
PX02016	Application of Chemical Force Microscopy to Determine the Strength of Bonds between High Explosives and Binders	\$93424
PX02020	Non Contact Measurement and Infrared Temperature Imaging of Explosives	\$55578
PX03001	High-Precision Non-Contact White Light Digitizing Sensor	\$387583
PX03002	Enhanced Analysis Capability Supporting Accelerated Aging Studies	\$127557
PX03004	Formation and Detection of Pores in Polymeric Materials	\$230069
PX03005	Establishment of a High Explosive Explosives Powder Pattern Library	\$65073
PX03006	GMR Eddy Current System	\$74897
PX03008	Neutron Non-Destructive Imaging of Weapons Materials	\$298752
PX03009	Validating Ultra Sonic Output for Positional Accuracy	\$203398
PX04002	Pit Measurement System for Vertical Arrays	\$21421
PX04003	Characterization of Corrosion Mechanisms	\$163053
PX04004	Real-Time Gas Analysis of Weapon Component Internal Atmospheres	\$85305
PX04005	Advanced Radiation Alarm Monitoring System (ARAMS)	\$113533
PX04008	Pilot Plant Solids Addition Capability	\$13061
PX04010	Particle Size Control in Explosive Precipitation Processes	\$28131
PX04012	Fiber Optic Probe Development for Laser Spectroscopy	\$33804
PX04013	Characterization of Explosives in Solvents	\$46804
PX04015	Pilot LABSOSC System Evaluation & Application for Specific Gamma Spectrometry	\$87382
Total # of Projects for PTX:	24	Total Cost for PTX: \$2338687 *

*Does not include \$98,124 of administrative and related implementation costs.

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
38605	Microfabrication with Femtosecond Laser Processing	\$347433
38606	Meso-scale Controlled Motion for a Microfluidic Drop Ejector	\$334982
38609	Physical and Electronic Changes caused by Membrane Signaling as a Transduction Pathway in Affinity Based Biosensors	\$301384
38610	Graduated Embodiment for Sophisticated Agent Evolution and Optimization	\$330436
38613	Scalable Fault Tolerant Algorithms for Linear-Scaling Coupled-Cluster Electronic Structure Methods	\$245288
38614	Micromagnetic Suspension	\$161625
38615	Sensitivities for Large-scale Simulation Codes	\$226345
38616	Engineered Superconductivity in Electron-hole Bilayers	\$281823
38617	Silicon-based RF MEMS Components	\$306159
38619	Nano-electromechanical Oscillators (NEMOs) for RF Filtering	\$298606
38620	Continous Wave Intersubband Terahertz Sources	\$387265
38621	Microsystems for Chemical Signature and Reagent Delivery	\$303231
38622	Microfluidic Cellular Sample Pretreatment	\$269885
38623	Automated Visual Direction of Mobile Manipulation	\$288205
38624	Miniature Fourier Transform Ion Mobility Spectrometer for Real Time Detection and Identification of Explosives and Chemical Agents	\$254209
38627	EM Interactions with Systems to Enhance Security	\$206908
38629	Use of Seismic and Acoustic Responses to Assess Bomb Damage to Underground Facilities	\$196772
38655	Free-Space Electro-Optic Sampling and Remote Mapping of Electromagnetic Fields from Emitting Structures Using Femtosecond Terahertz Transceivers	\$246238
38662	Natural Gas Production Problems: Solutions, Methodologies, and Modeling	\$289423
38665	Time Domain Reflectometry for Remote, Real-Time Water Quantity/Quality Monitoring of Perennial and Ephemeral Streams	\$192395
38668	Functionalized Nanoelectrode Arrays for In-situ Identification and Quantification of Regulated Chemicals in Water	\$250363
38673	Water Desalination	\$314480
38674	Revolutionary Systems for Catalytic Combustion and Diesel Catalytic Particulate Traps	\$373890
38677	Potential Application of Microsensor Technology in Radioactive Waste Management - With Emphasis on Headspace Gas Detection	\$242360

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
38681	Identification of Chemical Plumes: Range-Resolved IR Lidar Enabled by New Photonic Technologies	\$539653
38684	A Robust, Coupled Approach for Atomistic-Continuum Simulation1	\$351037
38685	Microscale Rarefied Gas Dynamics and Surface Interactions for EUVL and MEMS Applications	\$281127
38686	High Fidelity Frictional Models for MEMs	\$395397
38687	Soot Formation, Transport, and Radiation in Unsteady Diffusion Flames	\$277899
38688	The Basics of Aqueous Nanofluidics: "Interphase" Structure and Surface Forces	\$292608
38689	Design, Synthesis, and Characterization of Soft Matter Nanolayer Superlattices	\$330170
38690	Photo-control of Nano-interactions in Microsystems	\$278592
38691	Electrochemically Deposited Alloys With Tailored Nanostructures for LIGA Micromachines	\$345299
38692	Nanostructured Materials for Directed Transport of Excitation Energy	\$194505
38693	Modeling Local Chemistry in the Presence of Collective Phenomena	\$174081
38717	Nano-Scale Energetic Materials By Inverse Micellar Synthesis	\$301749
38718	Modeling of Rock Penetration	\$218596
38722	Agile, Microsystems-Enabled Receiver	\$491890
39017	Solution-Based Nanoengineering of Materials	\$343887
39670	Simulations of Intense Petawatt Laser Pulses with Dense Z-Pinch Plasmas	\$305153
41193	Bio MicroFuelCell	\$2938785
41194	Augmented Cognition: Next-Generation Intelligent Systems	\$3816426
41674	MicroEngine for Advanced Power Generation	\$398229
41726	Direct Simulation of Solid-Fluid Systems	\$40000
42461	Support-Active Site Interactions in Heterogeneous Catalysts	\$102886
42483	An Analysis of the Automotive Industry as a Source for Weapon Components and Manufacturing Processes	\$172288
46070	High Speed Micro-EDM	\$40000
46686	Micro External Combustion Engine: The P3 Engine Prototype	\$20000
47795	Lipid Membranes on Nanostructured Silicon	\$68268
49769	Resin Infusion between Double Flexible Tooling	\$20916

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
49772	Studies on the Disbonding Initiation of Interfacial Cracks	\$20000
49915	Critical Technology Development for Hard Target Defeat High-G Tolerant Fuze and High Explosives	\$752386
50065	TALON	\$3943937
50396	Compliant Membranes for MEMS Microphones	\$25000
50717	Multi Scale Experimental/Numerical Study	\$50000
50772	Cellular Observatory: Simultaneous Time- and Frequency-Resolved Microscopy	\$289806
52523	Atomic Layer Deposition of Highly Conformal Tribological Coatings	\$401207
52524	Assembly of Microsystems using Exothermic Multilayer Thin Films	\$341653
52526	Intelligent Interaction Control as Applied to Metrology and Assembly of Micro-Scale Components	\$353783
52527	Rapid Prototyping High-Density Circuitry (RpHdc)	\$339181
52528	Elucidating the Mysteries of Wetting	\$452097
52530	Next Generation Spindles for Micromilling	\$99174
52531	Assembly and Actuation of Nanomaterials Using Active Biomolecules	\$510980
52532	Modeling Biomembranes	\$337463
52533	Reverse Engineering Biological Networks: Applications in Immune Responses to Bio-Terrorism Threats	\$382977
52536	High Throughput Identification of Molecular Machines Involved in Membrane Signaling and Toxin Pathways	\$328937
52537	Coupled Solid-fluid-mechanical Computational Modeling of Fracture and Fragmentation in Geomaterials, Such as Hard and Deeply Buried Targets (HDBT)	\$349942
52538	Sequestration of Pathogens on Nanoengineered Surfaces	\$558421
52539	A Combined Preconcentrator and Sensor for Live Water-borne Pathogens	\$309465
52540	IP Storage: A Performance and Security Study	\$208835
52541	A Parallel Circuit Simulator for Cell Biology	\$238222
52542	Developing a Computationally Efficient Dynamic Multilevel Hybrid Optimization Scheme using Multifidelity Model Interactions	\$253376
52543	Robust Large-Scale Parallel Nonlinear Solvers for Simulations	\$202976

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
52544	Development of Computational Algorithms and Inversion Capabilities for Transport/reaction Simulations of Chemical/biological/radiological Terrorist Attack Scenarios in Support of Homeland Security	\$746138
52546	Massively-Parallel Linear Programming	\$210411
52548	Active Photonic-Crystal Devices for Integrated Photonics and Silicon photonics	\$361568
52549	Co-processing of Chalcogenide-Based Radiation-Hard Nonvolatile Memories by Sandia's MDL and BAE Systems.	\$328476
52551	Functionalized Nanoparticles for Sensor Applications	\$432475
52552	Novel In Situ Mechanical Testers to Enable Integrated Metal Surface Micro-machines	\$401774
52553	Compliant Thermo-Mechanical MEMS Actuators	\$259951
52554	An Integrated, Stacked System-on-a-chip	\$399385
52555	Micro Mass Spectrometer on a Chip	\$310922
52556	Quantum Coherence in Semiconductor Nanostructures for Improved Lasers and Detectors	\$357285
52557	MOSFET-MEMS Integration	\$352361
52566	Micro Optical Gyroscope Via Monolithic Active/Passive Optical Integration	\$374396
52570	Materials Physics and Device Development for Improved Efficiency of GaN HEMT High Power Amplifiers	\$390179
52571	Leaky-mode VCSELs for Photonic Logic Circuits	\$366574
52575	Advanced Polychromator Systems for Remote Chemical Sensing	\$336249
52577	Immunological Basis for High Reliability Systems Control	\$221127
52580	Moving Target Identification Using Ultra High Range Resolution Data	\$261025
52581	Advanced Mobile Networking, Sensing, and Controls using Graph Theory	\$345793
52582	Compact TeraHertz (THz) Sources for Emerging Threats applications	\$322443
52583	Understanding Communication in Counterterrorism Crisis Management	\$330354
52584	Hyper-Velocity Impact Generated Flash	\$269116
52585	Improving Human/System Interactions in Systems-of-Systems	\$500052
52586	Distributed Detection & ID Algorithm Architecture for Unattended Ground Sensors	\$234591
52587	Secure Chaotic Communications	\$280430

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
52588	System of Systems Modeling and Analysis	\$499664
52589	Eye Safe Short Range Standoff Aerosol Cloud Finder	\$140838
52590	Micro Flame-Based Detector Suite for Universal Gas Sensing	\$321596
52591	Beyond Nanoparticles - Attack on a Chemical "Holy Grail"	\$251360
52592	Advanced Proton-Exchange Materials for Energy Efficient Fuel Cells	\$387060
52593	Alanate-Hydride Fuel Cell Demonstration Project	\$359915
52595	Real-time Discriminatory Sensors for Water Contamination Events	\$324393
52596	Advanced High Efficiency Direct Cycle Gas Power Conversion Systems for Small Special Purpose Nuclear Power Reactors	\$370320
52597	Securing Mobile Code	\$302290
52598	Novel Catalysts For Hydrogen Fuel Cell Applications	\$299822
52606	Linking Optimization and Simulation in Critical Infrastructure Systems	\$372659
52698	Decomposition of Contaminants Using Photochemically Active Nanoparticles	\$437110
52699	Thermally Cleavable Surfactants	\$301919
52700	Transition-metal Catalyzation of Complex-hydride Absorption/desorption Reactions	\$201623
52701	Quantification of Environments and Surfaces within Micro-Packages	\$370623
52702	Assembly of Ordered Electro-Optical and Bioactive Materials and Composites	\$399276
52703	Advanced Packaging / Joining Technology for Microsystems	\$344278
52705	Magnetostrictive Elastomers for Actuators and Sensors	\$150445
52706	Development of a High-Throughput Microfluidic Integrated Microrray for the Detection of Chimeric Bioweapons.	\$193045
52708	Zero-Power Radio Receiver	\$249411
52709	Completely Passive Microwave Tag	\$218329
52710	Security Coatings for Multichip Modules	\$305937
52711	Detailed Modeling and Simulation of Contaminant Transport in Architectural Spaces	\$360793
52712	Content-Based Video and Image Indexing System	\$172361
52713	Bioaerosol Collection & Concentration for Microseparations-based Detectors	\$474951
52714	Detecting The Toolmarks Of Genetic Engineering In Bioweapons Strains	\$255800
52716	Joint Authentication/Encryption	\$196477

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
52717	Ultra High Temperature Ceramics for Hypersonic Vehicle Applications	\$256891
52718	Leveraging Robotic Planning for Physical Security Analysis	\$227442
52720	Ultra-Lightweight Telescope with MEMS Adaptive Optic for Distortion Correction	\$446742
52721	Modeling Signals from Earth Penetrating Nuclear Weapons for Remote Kill Assessment	\$329209
52723	Novel Micro-Preconcentrators For CW, Explosives And Water Surety	\$250379
52724	Ion Mobility Spectrometer-Mass Spectrometer	\$305924
52725	Cryptographic Assurance of Execution Correctness and Confidentiality	\$201771
52726	Characterization, Performance and Optimization of PVDF as a Piezo-electric Film for Advanced Space Mirror Concepts	\$307148
52727	Predictive Accelerated Aging of Microsystems: The Science of Dormancy	\$597601
52728	Surety and Accountability Enhancements for Storage Containers	\$289926
52729	Nuclear Safety Weaklinks for Thermal and Mechanical Environments	\$441433
52730	Advanced Packaging Technology for Optical Firesets	\$293651
52731	Miniature Transmitter Filter for JTA Using LIGA Technology	\$254005
52732	Novel and Robust Environmental Sensing Devices (ESDs)	\$497058
52733	Advanced Neutron Monitors for JTA and Stockpile Monitoring	\$320508
52737	Development of an Efficient Large-Aperture High Damage-Threshold Sol-gel Diffraction Grating	\$197378
52738	Laser Triggering of Water Switches in Terrawatt class Pulse Power Accelerators	\$194959
52739	Experimental and Computational Study of Liquid-Solid Transition in Tin	\$96601
52977	Flow Control and Mixing in Microfluidic Devices	\$20000
53464	Atomic-scale Scanning Tunneling Microscopy Measurements of Nucleation and Growth of Ge/Si Alloy Structures	\$20000
53465	Micro/Nanoscale Thermomechanical Manufacturing	\$20000
53585	Novel Diagnostics for Rarefied Flows in MEMs Applications	\$228327
53586	Geophysical Subsurface Imaging and Interface Identification	\$251001
53587	Evolution of Near Surface Scalar Concentrations Through a Compact Cylinder Array Embedded in the Atmospheric Surface Layer	\$25000
53588	Miniature High-Power RF Components Enabled by Meso-scale Manufacturing	\$110176

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
53590	Electrical Conductivity of Metal Alloys	\$173984
53591	Hydrogen Futures Dynamic Simulation Model	\$200007
53681	Design of Bio Specific Surfaces to Control Specific Cellular Responses	\$20000
54211	Nanomagnetic Films	\$20000
54213	A Multi-scale Approach to Modeling Carbon Nanotube Reinforced Composites	\$20000
55079	Near Real Time Characterization for Assured HDBT Defeat	\$2666485
55086	Prompt Global Response	\$2405321
55087	Winning the War: A Systems Approach to Defending Our Borders	\$1697561
57300	Integrated Superhard and Metallic Coatings for MEMS	\$51621
57307	Microscale Separations of Biological Compounds Using Novel Polymeric Separations Materials	\$50118
57308	Friction in Micromachine Interfaces	\$32404
57309	Lipid Microarray Biosensor for Biotoxin Detection	\$40000
57310	Advanced Manufacturing Techniques Using Rapid Prototyping	\$50674
57311	Robust Hermetic Packaging Techniques for MEMS Integrated Microsystems	\$40000
58907	Active Photonic Nanostructures	\$526640
59034	3-D Large Eddy Simulation of Turbulent Flow based on One-Dimensional Turbulence Modeling	\$80234
59916	A Method of Evaluating Research Using New Innovation, Risk, and Impact Indicators	\$287383
61046	Photonic Encryption using All-Optical Logic	\$80346
62269	Nanoporous-Carbon Adsorbers for Chemical Microsensors	\$121208
62827	Non-Lethal Technologies for the War on Terrorism	\$395413
64811	Agent-Based Control of Distributed Infrastructure Resources	\$331404
65559	Direct Single Ion Machining of Nanopores	\$61782
66170	Investigation of the Effects of Intense Pulsed Particle Beams on the Durability of Metal-to-Plastic Interfaces	\$38678
66450	Advanced Techniques for Multi-Objective Discrete Optimization	\$20000
66809	Non-radioactive Safety & Performance Issues with Supercritical Water Reactor Safety (SCWR) Technologies	\$25000

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
66810	Radiation Performance Issues with Advanced Coolants for Next Generation Reactor	\$25000
67004	Rapid Prototyping to the Nanometer Scale	\$294525
67005	Robust Manufacturing of Gel-based Components for Nuclear Weapons	\$93194
67006	Meso-/Micro-Optical System Interface Coupling Solutions	\$277340
67007	Injection Molding of Net-Shape Active Ceramic Components	\$318437
67008	Macro-Meso-Microsystems Integration in LTCC	\$351980
67010	Studies of Signaling Domains in Model and Biological Membranes Through Advanced Imaging Techniques	\$343958
67011	Imaging Self-Organization of Proteins in Membranes by Photocatalytic Nano-Tagging	\$294291
67012	Protein Microarrays for Biowarfare Agent Detection and Characterization	\$336385
67013	Interaction of Proteins with Lipid Films	\$271149
67014	New Technologies for Understanding Membrane Protein Recognition and Signaling	\$85088
67015	Massively Parallel Scalable Atmosphere Model	\$200021
67016	High Performance Processing Architecture	\$161879
67017	Substructured Multibody Molecular Dynamics	\$258826
67018	Enhancing Simulation Performance on Clusters with Configurable Auxiliary Devices	\$174480
67019	A Hybrid level-set/particle Method for Modeling Surface Evolution During Feature Scale Etching and Deposition Processes	\$135264
67020	Penetrator Reliability Investigation and Design Exploration (PRIDE)	\$449256
67021	Topology Optimization for Improving Sensor Performance	\$235371
67022	Characterization and Application of Dielectrics with Controlled Leakage	\$321809
67023	Nano-g Accelerometers Using Nanophotonic Motion Detection System	\$498746
67024	Bragg Fiber Development	\$295945
67025	Microwave to Millimeter-wave Electrodynamical Response and RF Applications of Semiconductor Quantum Nanostructures	\$350365
67026	Development of GaN 20-100 Watt Ku-Band Power Amplifiers for Micro-SAR	\$299965
67027	Evanescent Wave Planar Photonic Biosensor	\$302737

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
67028	Passive Electronically Steerable Array (PESA) for Miniature Synthetic Aperture Radar (miniSAR), Precision Guidance, and Intelligence/Surveillance/Reconnaissance (ISR)	\$300519
67029	Advancements in Sensing and Perception using Structured Lighting Techniques and an Innovative Design Tool	\$226400
67030	Biophysics of BW-Warhead Defeat with a Kinetic Interceptor	\$247361
67031	Dispersal in Urban Canyons, Source Identification, and Collateral Damage/Mitigation Assessment	\$20252
67032	Weaponization of Thermobaric Explosives	\$244775
67033	Development of an Enterprise-Scale Agent-Based Autonomic Logistics Simulation Model	\$249736
67034	Mobile Node Authentication in a Wireless Ad hoc Environment	\$212288
67035	Novel Processing, Affordable Motion Compensation, and Mode Multiplexing for Miniaturized Synthetic Aperture Radar	\$431871
67036	Coilgun Technology Demonstration Testbed	\$307760
67037	Enhanced Perception for Remote 3D Mapping of Unknown Indoor and Outdoor Environments	\$340146
67038	A Modular Micromagnetic Accelerometer-in Support of the mTalon Vision	\$272113
67039	MICROFUZE Integration	\$488997
67040	Realistic Crowd Behavior Models Using Individual Cognitive Agents	\$268
67041	Analysis of Technology Impacts on Operations in Complex Environments	\$443267
67042	CBW Cloud Knockdown and Neutralization	\$216217
67043	Assessment of Bio-Killers in EDS for Biological Agent Destruction	\$55568
67044	Adaptive Force Feedback Surface Control	\$247784
67046	High-Capacity Earth Penetrator Instrumentation	\$314585
67047	Systems Analysis of Networked Sensors	\$288674
67048	Deployable Object Tracker for NMD Flights	\$146160
67049	Continuous-Flow Detector for Rapid Pathogen Identification	\$205028
67050	Biological-Security Decontamination Technology -- Reducing the Threat of Infectious Agent Spread	\$100849
67051	Consequence Management, Recovery, and Restoration after an Intentional Contamination Event	\$100211
67052	Fully Integrated System Dynamics Toolbox for Water Resources Planning	\$277603

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
67053	Predicting System Performance of Proton-Exchange-Membrane Fuel Cells: Computational Modeling with Experimental Discovery and Validation	\$323106
67054	Optimal Allocation of Terrorist Countermeasures Using Risk-based Systems Pathways Analysis	\$278354
67055	Silicon Field Emission Electric Propulsion Arrays (FEEP) Powered by Orbital Nuclear Reactors	\$350861
67056	Advanced Fuel-cell Reactor for the Direct Cogeneration of Electricity During Selective Partial Oxidation of Hydrocarbons	\$368327
67057	New Hydrogen Storage Material: Metal-N-H system	\$102269
67058	Intrusion Detection for Wireless Networks	\$304745
67059	Membranes for H2 Generation from Nuclear Powered Thermochemical Cycles	\$254826
67060	Microfabricated BTU Monitoring Device for System-Wide Natural Gas Monitoring	\$99838
67061	"Tunable" Ion Conductors for Low Temperature Oxide-based Fuel Cells	\$218148
67062	Nuclear Nano-Batteries: on-board power for independent MEMS devices	\$54320
67063	Integrated Tunable Light Sources for Miniature Sensors	\$99558
67064	Ray Model of High Frequency Cavity Scarring	\$127739
67065	New Smart Material to Address Issues of Structural Health Monitoring	\$83903
67067	Noncontact Surface Thermometry for Microsystems	\$272181
67068	High Speed Interferometric Deformation Measurements	\$270460
67069	Fundamentals of Nanofluidics	\$281475
67070	Simulating Self-assembly and Growth of Biological Nanostructured Materials	\$230008
67071	A Low-Power Ultra-Fast Current Transient Measuring Device	\$89602
67073	A Capillary Valve for Microfluidic Systems	\$92195
67074	Electrochemically Switchable Materials for (Bio)Microfluidics	\$206649
67075	Modeling of Friction-Induced Deformation and Microstructure	\$501771
67076	Reversible Antibody Trapping for Selective Sensor Devices	\$196803
67077	Correlated and Comprehensive Analytical Techniques for Homeland Defense	\$511758
67078	Development of High Energy Density Dielectric Materials for Integrated Microsystems	\$299975
67079	Nanolithography Directed Materials Growth and Self-Assembly	\$392928

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
67080	Development of a Novel Technique to Assess the Vulnerability of Micro-Mechanical System Components to Environmentally Assisted Cracking	\$183339
67081	3D Optical Sectioning with a New Hyperspectral Deconvolution Fluorescence Imaging System	\$539426
67082	The Science of Solutes: Transition Metals in LIGA Nickel	\$286932
67083	Novel Gel-Based Technology for Sensors and Weapons	\$100002
67084	Coupled Nanomechanical Oscillator Arrays for the Study of Internal Dissipation in Nano-scale Structures and Collective Behavior in Large Systems	\$312608
67085	Precisely Controlled Picoliter Vessels with Rapid Sample Preparation for Trace Biotoxin Detection	\$225039
67086	Adaptive Optics and Phase Diversity Imaging for Responsive Space Applications	\$244693
67087	Infrastructural Development for Flexible Network of Devices	\$516720
67088	Monolithic Reconfigurable Radio-Frequency Microelectromechanical System (RF MEMS) Antennas	\$334504
67089	Next-Generation 3D Inspection System for Facility Monitoring	\$258215
67090	Risk Assessment Meta Tool	\$150053
67091	Featureless Spread-Spectrum Waveform Design and Processing	\$216526
67092	Tracking Slow-Moving Objects in a GPS-Denied Environment	\$328904
67093	Optical Communications	\$179677
67094	A Unique Vibration-Based Miniature Power Generator for National Security Applications	\$230762
67095	Image Georectification Using Digital Elevation Model Shadows	\$195801
67096	Vulnerability Assessment of State-of-the-art Microelectronics	\$217364
67098	Nonlinear Optical Detection of Biological and Chemical Aerosol Agents Using Femtosecond Lasers	\$355448
67099	Polymer Electronic Devices and Materials	\$488703
67101	Small Circuits for Cryptography	\$99216
67102	Analysis of Multichannel Internet Communication	\$89145
67104	Receiver for Ultra-Low Power Wake-up and Command	\$184412
67105	Extraordinary Optical Transmission through Patterned Subwavelength Apertures	\$137572

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
67107	Reconstruction Algorithm Development and Assessment for a Computed Tomography Based-spectral Imager	\$335275
67108	Power Combining Techniques for Solid State Power Amplifiers (SSPAs)	\$354754
67109	Dispersive Diffractive Optical Elements for the Infrared	\$506930
67111	Atmospheric Propagation of THz Radiation	\$114626
67112	Thermophotovoltaic Power Sources	\$69386
67113	High-Confidence Estimation of Relative Event Locations from Space-Based Sensors	\$158608
67114	Critical Infrastructure System of Systems Assessment Methodology	\$465632
67115	Dynamic Vulnerability Assessment	\$127441
67116	Inflatable Antenna with Adaptive Actuators	\$261595
67117	Data Driven Dynamic Models of Conflict	\$100743
67118	MEMS / Fuze Diagnostic Extraction in High-G Environments	\$172791
67120	Efficient Implicit Multigroup Radiation Calculations	\$142372
67121	Model for Channel Resistance in Water Breakdown	\$69491
67122	Embeddable Shock Physics Sensors	\$170680
67716	Smart Detectors of Enrichment of Bio-Aerosols	\$20000
68063	Computational Studies of JP-8 Diffusion Flames with Detailed Chemistry and Particulate Formation	\$20000
69143	Design and Fabrication of Advanced Device Structures for Ultra High Efficiency Solid State Lighting	\$477774
69145	Molecular Simulation of Beta-amyloid (A-beta) Peptide Interaction with Phospholipid Membranes.	\$49999
69146	Nanoscale Testing of Deformation and Fracture in Engineering Materials	\$50663
69148	Nanocrystal-Polymer Composites for High Luminous Efficiency LEDs	\$401819
69149	Outstanding Challenges for AlGaInN MOCVD	\$407568
69150	Nanoporous Polymeric Materials for Chemically and Spatially Multiplexed Sensing of Bioagents	\$96365
69151	Evolutionary Complexity for Protection of Critical Assets	\$90695
69152	Nanomechanical Stochastic Resonators	\$75979
69153	Augmented Musculature Device	\$101229
69154	Biomolecular Decision-making Processes for Self-assembly	\$360904

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
69155	Light-Powered Nanovehicle Propulsion	\$100679
69156	System Dynamics Modeling to Assist Regional Water Planning: Modeling the Non-Market Value of Water	\$25000
69157	Interactive Water Quality Modeling to Assist Regional Water Planning	\$25000
69158	Microbe-Exuded Polymers and the Enhanced Corrosion of Carbonate Materials	\$50000
69159	Nerve Cell Function and the Development of Cognitive Networks	\$74106
69160	Ultrahigh Gain Fusion Concept	\$80385
69161	Nanofluidic Devices for Rapid Detection of Virus Particles	\$128627
69162	Solution Behavior of PEO: the Ultimate Biocompatible Polymer	\$102424
69163	New Self-assembled Nanocrystal Micelles for Biolabels	\$99918
69164	Rapid Detecton of Biothreat Agents Based on Cellular Machinery	\$102046
69165	Patterning Quantum Dot Arrays using DNA Replication Principles	\$104093
69166	Adaptive Algorithms for Use in the Rejection of Periodic Disturbances of Unknown Frequency	\$25000
69168	Property-based Testing for Cyber Security Assurance	\$50000
69170	Self-Assembled Ordered Carbon-Nanotube Arrays and Membranes	\$100455
69189	Chemical Crosslinking and Mass Spectrometry Studies of the Structure and Dynamics of Membrane Proteins and Receptors	\$703291
69190	Toxin Studies Using an Integrated Biophysical and Structural Biology Approach	\$325511
69191	Top-Down Structural Studies	\$238444
69192	Molecular Dynamics of Membrane Proteins	\$123104
69193	Model-Building Codes for Membrane Proteins	\$183057
69198	Poroelastic Wave Propagation on the Earth Simulator	\$172725
69239	Development of Micro Reformers for Fuel Cells	\$59278
70799	Developing the Foundation for Polyoxo-niobate Chemistry: Highly Tunable and Exploitable Materials	\$209804
71943	Simulating Human Behavior for National Security	\$415464
71944	Agent-based Modeling of Middle East Terrorist Recruitment	\$100523
71945	Automatic Generation of Terrorist Operation Plan Hypotheses	\$389500

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
72599	Develop a System Dynamics Modeling Framework for Assessing Factors that Influence Water Resource Consumption	\$166613
72600	Develop a Cooperative Water Management Process, Creating a System Dynamics Model of Water Resources in the Lower Rio Grande Basin	\$171791
72715	Compact Ultrabright Multikilovolt X-Ray Sources for Advanced Material Studies, 3D Nanoimaging, and Attosecond X-Ray Technology	\$516146
72716	Energy Systems Analysis Framework and Modeling	\$526207
73045	Radiation/Geometry-Driven Jets: Proof-of-Principle Tests	\$76733
73185	Superhydrophobic Surface Coatings for Microfluidics and MEMS	\$444100
73207	Micro Optical Radar (MOR) Facial Recognition Project	\$825306
73362	The Neuroscience of Group Collaboration	\$2427
74545	Determining Explosive Ignition Criteria for Miniaturized Devices	\$100767
74546	Quantum Squeezed Light for Probing Mitochondrial Membranes and Study of Neuroprotectants	\$194955
74547	Characterization of a New Class of Surface Micromachined Pumps	\$25469
74548	Risk of Biological Terrorism to Water Distribution Systems	\$107843
74759	Explicit and Implicit Measures in Human Aversive Classical Conditioning	\$50000
74760	Automatic Target Recognition Algorithms for Uncooled Thermal Imagery	\$199144
74795	Magnetophoretic Bead Trapping in a High Flowrate Biological Detection System	\$79999
75441	TPV Energy Scavenging for Hypervelocity Vehicles	\$68405
75442	Assessment of Advanced Pulsed Power Fusion Concepts	\$256092
75443	A Mathematical Method for Quantifying the Effectiveness of Management Strategies	\$87634
75513	Developing Algorithms for Predicting Protein-protein Interactions from Experimental Constraints	\$71441
75514	Instrumentation Development for Real Time Brain Wave Monitoring	\$81209
75786	Maximally Autonomous Autodirective Antenna Array Technology	\$25000
76069	Miniaturized Electronic Steerable Array Synthetic Aperture Radar	\$836994
76070	Full-Earth Monitoring Sensor MESAWorks	\$796550
76305	Systems Assessment of Water Savings Impact of Controlled Environment Agriculture Utilizing Wirelessly Networked SDACs	\$161437

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SNL - Sandia National Lab

Project ID	Project Name	FY Total
76306	Inactivation of Avian Influenza (Bird Flu) with Sandia Developed Decontamination Formulations	\$100368
78132	Deciphering the Genetic Regulatory Code Using an Inverse Error Control Coding Framework	\$72777
78307	Climate Change Effects on International Stability	\$120613
78783	Generalized Continuum Models for Inelasticity in Solids: Formulation of Theories, and Variational Methods for Computation	\$50000
79943	GeSi Strained Nanostructure Self-assembly for Nano- and Opto-electronics	\$11959
80835	Vulnerability Analysis for SCADA	\$113624
80838	Molten Salt-Based Growth of Bulk GaN and InN	\$59899
81209	Randomness Complexity and Cryptography	\$60000
81354	System Study: Adaptive Optics for Weapon, Reconnaissance and Military Space Applications	\$27142
Total # of Projects for SNL:	354	Total Cost for SNL: \$102095427 *

*Does not include \$1,900,573 of administrative and related implementation costs.

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SRP - Savannah River Plant

Project ID	Project Name	FY Total
SR02015	Alanates as a New High Capacity H2/T2 Storage Material	\$15137
SR02016	Catalyzed Metallic Glass for H2 Separation	\$17906
SR02023	Hydrogen Isotope Permeation Testing	\$42957
SR02031	Large-scale Fabrication Process for Hydride/Sol-Gel Composites	\$40165
SR02033	Laser Cladding for Tritium Permeation Barrier Coatings	\$23625
SR02042	Thermal Absorption Diffusion Isotope Separation Process	\$124672
SR03001	Plasma Arc Process to Decontaminate Palladium for Recycle	\$67034
SR03002	Discover New Hydride Metal-alloys Using the "Materials as Systems" & "Combinatorial Library Synthesis" Methodologies	\$101328
SR03004	Modeling of Pressure Swing Adsorption Processes For Hydrogen Separations	\$10239
SR03005	Fill Stem Decontamination Using Plasma and/or Atomic Oxygen	\$75194
SR03006	Heat Transfer and Modeling of Next Generation Metal Hydride Beds	\$142470
SR03008	Catalyzed Alkali Metal Borohydrides for Tritium and Hydrogen Storage	\$149637
SR03014	Glass Microsphere Encapsulation of Hydrogen Absorbents	\$83498
SR03029	Evaluation of Alternate Stainless Steel Surface Coatings and Methods for Passivation	\$45922
SR03030	Evaluation of Non-Reactive, Permeation Resistant Materials for Tritium/Hydrogen Storage & Processing	\$50385
SR03036	Tritium Reservoir Performance Prediction and Analysis Tools	\$118790
SR03037	Pinch Weld Process Improvement Using Secondary Variable Analysis and Advanced Weld Controls	\$184969
SR03038	Development of Stainless Steel Alloys with an Innate/Self-Healing Permeation Barrier	\$149177
SR03046	Multiplexed Vapochromic Ammonia and Moisture Sensors for Tritium Process Monitoring	\$108129
SR03052	Universal Tritium Transmitters	\$159733
SR03053	Ion Chamber for Tritium Monitoring to Minimize High Backgrounds Due to Surface Area Contamination	\$30840
SR03054	Tritium Reservoir Surface Defect NDE Inspection Feasibility Study	\$34087
SR03060	Palladium on Ceramic as an Alternative to Palladium on Kieselguhr	\$72247
SR04001	Advanced Crystalline Nanoporous Materials for Tritium/Hydrogen Storage	\$105077

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

SRP - Savannah River Plant

Project ID	Project Name	FY Total
SR04009	Detection and Measurement of He-3 Bubbles by Positron Annihilation Lifetime Spectroscopy	\$131987
SR04011	Develop Low Cost, High Sensitivity Optical Gas Sensors using Surface Enhanced Raman Spectroscopy	\$152137
SR04013	Feasibility Study of Pd Recovery from Pd/k using ARC melter	\$25008
SR04015	Improved material for methane cracking	\$128441
SR04025	Ultra-Fast Mass Analysis of Hydrogen Isotopes	\$90457
SR04030	Laser Ablation for Spatially-Resolved Solid Phase Tritium Assay (Scoping)	\$86758
SR04032	Carbon Nanotubes for Sensors	\$86791
Total # of Projects for SRP: 31		Total Cost for SRP: \$2654797

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

Y_12 - Y-12 Plant

Project ID	Project Name	FY Total
Y1201006	Net Shape Forming (NSF)	\$17077
Y1201020	Rapid In-situ Identification of Fissile Material Type in Cans	\$75448
Y1201021	Direct Electrolytic Reduction of Uranium Oxides	\$30150
Y1201029	Real-Time Beryllium Oxide (BeO) Monitoring	\$520721
Y1201030	Advanced Thermal Cutting Processes for Disassembly	\$66207
Y1201033	Enhanced Absorption of Microwave Energy	\$72697
Y1201039	Real-Time Monitor For Measuring Beryllium In Air	\$49543
Y1201043	High-density, Noncontact Inspection of Work Pieces	\$58097
Y1201053	Advanced Technology Assessment Team	\$75337
Y1202005	Hand-Held Enrichment Meter	\$34054
Y1202007	Alternative Fluorinating Agents to Produce UF ₄	\$28855
Y1202009	Real Time Identification of Airborne Particles (Be, U, etc.)	\$33883
Y1202014	Advanced Melting Process Using High Flux Density Infrared (IR)	\$462495
Y1202015	Infrared (IR) Heating for Preheating Uranium Billets	\$131776
Y1202036	Chromatographic Separation	\$30882
Y1202039	Equal Channel Angular Processing	\$75233
Y1202040	Improved Material Properties Through Application of GBE	\$42888
Y1202052	Advanced Analysis Engine	\$154014
Y1202053	High Resolution Imaging System for Digital Radiography	\$188991
Y1202096	Zone Refining	\$174531
Y1202097	Alt. Uranium Casting	\$12909
Y1202099	Predictive Performance Indicators	\$38501
Y1202101	Tool Tuning	\$85574
Y1202102	Fisk Rad Detectors	\$26119
Y1202103	Fuzzy Logic Analysis of Measurement	\$33519
Y1202105	UNCC Hole Plate	\$46789
Y1202106	UFL HSM	\$89057
Y1202107	NCSU Artifact	\$108904
Y1203001	Radiograph Archival	\$42304

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

Y_12 - Y-12 Plant

Project ID	Project Name	FY Total
Y1203006	Enhanced Chip Casting	\$17866
Y1203010	U-C Properties	\$192405
Y1203014	High Accuracy, High Density	\$156958
Y1203016	Salt Certification Substitution	\$109273
Y1203020	Holo Interferometry	\$119441
Y1203021	Micro CT	\$74018
Y1203023	SFM Process Monitoring	\$80627
Y1203032	High Speed Machining	\$137413
Y1203039	Advanced SDOR	\$104040
Y1203043	ID of Ultra Fine Particles	\$86387
Y1203050	Lugless Casting	\$73274
Y1203051	Multizone Furnace	\$104455
Y1203059	High Gradient Magnetic Filtration	\$305135
Y1203065	Digital DU	\$158945
Y1203073	LiH Assessment	\$188558
Y1203074	IWMS	\$2116100
Y1203075	Project 2	\$97938
Y1203076	Tech Infusion	\$116953
Y1204006	Cone Beam X-ray CAT scan	\$189748
Y1204008	Mold Material	\$24939
Y1204013	Be Swipe Colorimetric Screening	\$29523
Y1204015	Chemistry Control Using Slow Solidification	\$14786
Y1204019	Surface Metrology	\$42529
Y1204036	Wireless Predictive Maintenance	\$95974
Y1204037	Process Radiation Detector System	\$71646
Y1204040	U Compatibility with Crucible Materials	\$290926
Y1204041	Slag Reprocessing	\$60205
Y1204045	Next Generation MW	\$66485
Y1204059	NMC&A Confirmatory Cart	\$88224

United States Department of Energy
Laboratory, Plant or Site Directed Research and Development Report
Project List -- Fiscal Year 2004

Y_12 - Y-12 Plant

Project ID	Project Name	FY Total
Y1204062	Synergistic Casting Methodology	\$44183
Y1204087	Direct Conversion to Oxide	\$41945
Y1204102	Kathabar Alternatives	\$27892
Y1204103	Precision Electroplating	\$75299
Y1204110	Crucible Materials Thermo Modeling	\$25958
Y1204118	Wireless Systems Security Assessment	\$10429
Y1204126	Engineered Security Concepts	\$88198
Y1204127	Integrated Machining & Inspection at GT	\$47427
Y1204128	Source Model	\$36103
Y1204129	Wall Enhancements	\$6582
Y1204132	Selected Material Sanitization	\$32404
Y1204133	EMBOS	\$625449
Y1204134	Tusk Fracture Toughness with SSM	\$21867
Y1204135	UM - Optimet	\$501
Y1204136	Portable Metal Analyzer	\$4161
Y1204137	UNCC Improving Machine Tool Productivity and Quality	\$30283
Y1204138	Machining Uranium and Uranium Alloys	\$317
Y1204139	Unique Mass Spectrometry Capabilities	\$4824
Y1204140	Nanostructured Material Machine Tools	\$107458
Y1204141	Ultrasonic Vibration of Molten Metals	\$22238
Total # of Projects for Y_12:	78	Total Cost for Y_12: \$9274844 *

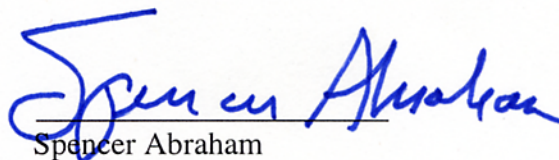
*Does not include \$592,313 of administrative and related implementation costs.

Departmental Procedures

The Conference Report accompanying the Energy and Water Development Appropriations Act for Fiscal Year 2002 (H.R. 4733) directs the Secretary of Energy to include in the annual report to Congress for all Laboratory Directed Research and Development (LDRD) activities the affirmation included below. In response to and as support for the annual affirmation, the Department revised its procedures for handling LDRD program charges on other Federal agency funded Work for Others projects in fiscal year 2002. These procedures changed the Work for Others process to ensure proper notification of other Federal agencies as to the LDRD charges prior to funding work at the laboratory. Specifically, each new and/or revised Work for Others proposal provided to a Federal agency must indicate the amount of LDRD charges that will be collected. Furthermore, the proposal notifies the sponsor that, by providing funding, the agency is acknowledging LDRD activities are beneficial to their organization and consistent with appropriation acts providing funds to that agency. Subsequently, each Work for Others funding acceptance document also includes the LDRD estimate acknowledgement.

Secretarial Affirmation

All LDRD activities derived from funds of other Federal agencies have been conducted in a manner that supports science and technology development that benefits the programs of the sponsoring agencies and is consistent with the appropriations acts that provided funds to those agencies.



Spencer Abraham

December 16, 2004

Date

LDRD Legal Authority and Order

The LDRD program operates under the same statutory and Departmental guidance that it has in past years, and the laboratories work closely with DOE personnel to assure the careful Federal oversight that both the letter and spirit of the guidance intends.

Authorization Basis

The Atomic Energy Act (AEA) of 1954, as amended, 42 U.S.C. 2011 et seq., Section 31, directs DOE to exercise its powers to ensure the continued conduct of R&D and training activities and to assist in the acquisition of an ever-expanding body of theoretical and practical knowledge in the fields of energy, its production, uses, handling, and effects. This mission was initially the responsibility of the Atomic Energy Commission (AEC), then the Energy Research and Development Administration, (ERDA) and subsequently that of DOE.

The current LDRD program is consistent with the mission of providing a program of conducting, assisting, and fostering research and development to encourage maximum scientific and industrial progress, contemplated in Section 3 of the AEA and confirmed in subsequent laws applicable to the successor agencies, ERDA and DOE. Public Law 95-39 (Section 303), dated June 3, 1977, authorized any laboratory under contract with ERDA, with the Administrator's approval, to "use a reasonable amount of its operating budget for the funding of employee-suggested research projects."

Section 3132(d) of the National Defense Authorization Act for FY 1991 (Public Law 101-510), set the funding limit for each Laboratory's program at 6 percent of the Laboratory's total operating and capital equipment budget. In FY 2000, Section 308 of the Energy and Water Development Appropriations Act (H.R. 2605) reduced the funding level to 4 percent with the additional restriction that none of the funds in the Environmental Management programs are available for Laboratory Directed Research and Development. This reduction had a notably deleterious effect on the LDRD program and the DOE National Nuclear Security Administration (NNSA) Laboratories. The Energy and Water Development Appropriations Act for FY 2001 (Section 306) restored the funding limit to 6 percent, and the explanatory language of the accompanying Conference Report (106-988) directed the Department's Chief Financial Officer "to develop and execute a financial accounting report of LDRD expenditures by laboratory and weapons production plant." The 6 percent funding level remained in effect in FY 2004.

DOE Orders Governing the LDRD Program

With this authorization basis, the LDRD program, since its inception in FY 1991, has been under continual oversight by DOE to ensure compliance with Congressional requirements. During

1991, the Department developed and implemented DOE Order 5000.4, *Laboratory Directed Research and Development*, establishing formal processes to manage and oversee the LDRD program. These processes have been subject to ongoing Departmental review and revision to ensure compliance with Congressional intent and with Departmental policies and requirements. On April 9, 1992, the DOE Order was revised to increase the emphasis on Departmental oversight of research and development activities. In 1993, individual program organizations provided additional instructions through a set of “Responsibilities and Guidelines.” In 1997, DOE updated the 1992 DOE LDRD Order to DOE Order 413.2, *Laboratory Directed Research and Development*,¹ and more recently to DOE Order 413.2A, *Laboratory Directed Research and Development*² to include the new NNSA.

DOE Order 413.2A provides guidance in the following areas:

- General criteria for the selection of LDRD projects;
- Limitations on the duration of LDRD projects;
- Limitations on the total maximum annual funding for the LDRD program;
- Excluded activities under LDRD funding;
- Responsibilities of DOE offices (including field offices); and
- Contractor requirements, including annual planning and reporting documents.

¹ DOE Order 413.2, March 5, 1997.

² DOE Order 413.2A, op. cit., p. 1.

DOE Program Management and Oversight

Overview

DOE's oversight of LDRD activities ensures that the objectives stated in DOE Order 413.2A, *Laboratory Directed Research and Development*, are accomplished by each laboratory's LDRD program. The objectives are to "maintain scientific and technical vitality of the laboratories; enhance the laboratories' ability to address future DOE missions; foster creativity and stimulate exploration of forefront science and technology; serve as a proving ground for new research; and support high-risk, potentially high-value research and development."

The oversight process is consistent with DOE's overall management approach and philosophy for all research and development activities, and includes annual planning and reporting documents and program and peer reviews. The Department followed a rigorous process in developing the LDRD policy and establishing the 6 percent maximum level. The 6 percent limit is a maximum and not an automatic provision. The Department approves a specific level of funding and a plan for each laboratory annually. In addition to the requirements and specific oversight mechanisms defined in DOE Order 413.2A, the Department conducts an annual evaluation of the full spectrum of science and technology at the laboratories as part of the overall appraisal of contractor performance. This evaluation spans all programmatic activities, and specifically includes LDRD, looking at its quality of science, strategic alignment, and relevance to DOE missions.

Much of the input to this retrospective evaluation comes from independent external peer review committees composed of scientific leaders from industry and academia as well as from the Federal research community including the laboratories themselves. The result of this science and technology evaluation is additional input for the Department in the assessment of the value and level of funding for LDRD activities. In addition, LDRD is an integral element of the laboratories strategic planning process and all research and development, including LDRD, conducted at the laboratories is reviewed at least annually through on-site reviews.

The Office of Science (SC), the Office of Nuclear Energy, Science and Technology (NE), and the NNSA have established a common oversight process to ensure the laboratories effectively manage their LDRD programs in accordance with DOE Order 413.2A. The process is designed to allow flexibility to the laboratory in implementing its LDRD program, while ensuring effective DOE oversight and stewardship of the taxpayers' dollars.

Planning

Each laboratory is required to submit an annual LDRD Program Plan for approval to the cognizant Secretarial Officer and Site Office Manager before the start of the fiscal year. The plan

must include a requested funding level as well as a general description and justification of the LDRD program. It must describe how the LDRD program will contribute to and strengthen the laboratory's science and technology capabilities, support the laboratory's mission and benefit the Department and the Nation. In addition, each laboratory must establish and describe criteria for selecting and prioritizing projects. These criteria include utilizing internal peer and scientific management reviews that support and validate the innovative scientific and technological excellence of the program. The cognizant Site Office reviews the laboratory's proposed annual LDRD plan and funding level and provides its written recommendation to the cognizant Secretarial Officer.

As part of this recommendation, the Site Office Manager certifies that the laboratory's method for accumulating LDRD funds meets the requirements of DOE Order 413.2A. The Order requires Site Office Managers to annually review and certify to Headquarters that the laboratory's method for accumulating LDRD funds is consistent with the maximum allowable funding, and is in accordance with terms and conditions of the laboratory's contract. The Site Office LDRD managers, as well as the field financial managers, are involved in conducting these reviews in early summer of each year. Financial accountability, as demonstrated by these reviews, is a strong factor in the Site Office's recommendation to the Department of the LDRD funding level.

The cognizant Secretarial Officers annually approve each laboratory's LDRD plan and the maximum funding that may be expended on LDRD activities for the next fiscal year. This approval is based on the reasonableness of the documentation, the Site Office's recommendation, results from the prior year's review of the program, and the Laboratory's overall performance in managing its LDRD program. The approval also considers input from appropriate Departmental program managers. Throughout the fiscal year, the DOE works closely with each laboratory and reviews any proposed LDRD program modifications or adjustments to ensure that the laboratories realize optimum mission benefits. No individual LDRD project may begin without concurrence from DOE.

Implementation

DOE has established efficient management policies and processes to provide effective oversight of the LDRD program. The management processes ensure proper oversight of current research thrusts while maintaining flexibility to address future needs.

The laboratories implement the LDRD program in accordance with the requirements in DOE Order 413.2A. While the timing or details of discrete DOE oversight activities may differ somewhat from laboratory to laboratory, the oversight processes among all the DOE program offices have certain key elements in common. For example, all LDRD projects are reviewed and approved by the cognizant Federal official prior to any work starting. In addition, DOE conducts a review of each laboratory's LDRD program to ensure consistency with Department policy, and to review technical success and proposed research. In the case of the NE and the three NNSA

laboratories, the review is conducted late in the fiscal year (August/September), permitting review and concurrence of proposed research for the next fiscal year. SC conducts their LDRD program reviews earlier in the year (May/June), prior to completion of the research proposal review cycle, and consequently has a separate activity later in the year that involves DOE concurrence of the next year's research portfolio. Representatives from other laboratories, as well as appropriate Departmental program managers, are invited to participate in the LDRD program reviews, to share lessons learned, and to promote best practices and continuous management improvement across the laboratories. All the laboratories have processes to review and assess the performance of individual research projects, and DOE is involved in those processes at the field offices as well as Headquarters. Again, the timing and details of this activity may vary among the program offices, but the end result is the same: corrective actions resulting from the oversight are implemented as needed, including changes in project scope, emphasis, or funding.

In addition to the specific oversight mechanisms defined in DOE 413.2A, the Department and its contractors conduct an annual evaluation of the full spectrum of science and technology at the laboratories as part of the overall evaluation of contractor performance. This evaluation spans all programmatic activities, and specifically includes LDRD, looking at its quality of science, strategic alignment, and relevance to DOE missions. Much of the input to this evaluation comes from independent external peer review committees composed of scientific leaders from industry and academia. The results of this science and technology evaluation are additional input for Headquarters in assessing the value and determining the funding level for LDRD activities.

Reporting

At the end of the fiscal year, each laboratory is required to submit an annual LDRD report to the cognizant Secretarial Officer and Site Office Manager. The LDRD Annual Report includes a technical and financial overview of the program as well as a short summary of each funded project. The Annual Report, in conjunction with the LDRD Program Plan, contains a description of the laboratory's LDRD management process, a summary of how the laboratory's LDRD portfolio relates to DOE/Laboratory missions, initiatives, and strategic plans, a description of the peer review process under which the LDRD projects are evaluated along with any relevant results; and a summary of the metric data as success indicators. Aggregated performance indicators, such as patents, awards, and follow-on funding, collected on the LDRD portfolio at each Laboratory are useful in revealing trends on the overall productivity of the program over time, although some of the more measurable results occur years after project completion.

The Site Office reviews the laboratory's LDRD Annual Report and forwards it to the Cognizant Secretarial Officer certifying the adequacy of the laboratory's LDRD management process and Laboratory adherence to the established criteria for LDRD projects. The Cognizant Secretarial Officer also reviews each laboratory's Annual Report to assess the laboratory's LDRD management systems and program performance. As part of this review, SC, NNSA, and NE ensure that the appropriate Headquarters program managers are involved as questions related to their programs are discussed and resolved.

In its independent FY 2001 report to Congress, the General Accounting Office stated,³

“All the LDRD projects we reviewed at the ...laboratories we visited met DOE’s guidelines for selection [and] had created the internal controls necessary to reasonably ensure compliance with DOE’s guidelines. The key controls in place included using DOE’s guidelines to control and conduct the project-selection process ...and ensuring appropriate DOE oversight and review of the results of the process.”

In summary, DOE’s oversight includes project approval, financial certification reviews, appraisal process reviews, Program Plan reviews (both in the field and at headquarters) and onsite reviews (both of technical content as well as management processes). Annually, DOE issues an approval letter for each laboratory’s LDRD Program Plan and confirms the maximum LDRD funding level that may be used for the program. Throughout the fiscal year, DOE works closely with each laboratory and reviews any proposed additions or adjustments to the program to ensure compliance with the DOE Order and that optimum mission benefit is realized by both DOE and the laboratories.

³ GAO-01-927, *op. cit.*, p. 10.

Laboratory Program Management

Overview

The DOE laboratories have implemented similar processes to manage their LDRD programs and select projects for funding. These processes have three major components: (1) a top-level strategic planning process to identify strategic science and technology areas for LDRD investment; (2) a call to the laboratory scientific and technical community for innovative and relevant proposals within the DOE mission areas; and (3) a scientific peer-review process to select an LDRD portfolio from these proposals, and a ranking process by senior management to prioritize the portfolio of projects for funding.

Strategic Planning

Early each fiscal year, laboratory directors and their senior management begin the LDRD cycle for the following year with a review of strategic directions, an assessment of the health of the science and technology underpinning laboratory missions, and an evaluation of the need for far-reaching fundamental research and development to maintain laboratory vitality for future missions. These activities identify the laboratory's strategic research and development needs. The review provides target allocations and determination of the LDRD program funding level as a percentage of the laboratory's total operating and capital equipment budget.

Within the LDRD program, priorities and budgets are set for three types of projects: (1) research and development demonstrations or proof-of-concept; (2) multifaceted research and development that has the potential to alter the laboratories' approach to solving programmatic challenges; and (3) long-range, high-risk fundamental research and development in broad science and technology areas underlying the laboratories' competencies and mission areas.

This process demonstrates the importance that laboratory senior management places on LDRD as a tool to maintain the vitality of the laboratories and to meet future programmatic needs and missions.

Call for LDRD Proposals

Once the strategic direction for the LDRD program is established, the laboratory LDRD program office issues calls for proposals to the scientific and technical community. This open call for proposals encourages the broadest participation from all laboratory scientific and technical staff, and ensures that the most innovative approaches are brought forward. Proposed projects range from those that focus strictly on strategic science and technology development to those highly innovative, creative projects that enhance the capabilities of the laboratories to accomplish their missions.

Selection of Projects for Funding

All proposals are subject to two types of review: scientific peer review and management review. The scientific peer review is based on criteria that include an evaluation of the proposal's innovation, impact, risk, programmatic and strategic relevance, scientific quality, feasibility, and quality of the project team. In a recent report reviewing the LDRD Program, the General Accounting Office described the peer-review process as follows:

“All laboratories used DOE’s LDRD Order 413.2A as the primary guidance to review and select projects. Individuals involved in the review and selection of the projects had the requisite background and experience to provide credible review. Those individuals had wide-ranging scientific backgrounds—usually a Ph.D. in scientific research and practical experience in basic scientific research. When the subject matter of a project proposal was outside the knowledge base of the review team, the laboratories generally contracted with outside experts to provide reviews and recommendations on the merits of that proposal. In general, each laboratory established review panels comprising individuals from across the laboratory, which provided for diverse opinions to ensure that various points of view were brought to bear on the selection decision.”

The management review includes participation by laboratory senior managers, program leaders, and leading scientists in selecting a portfolio of projects of the highest quality that are aligned with the strategic requirements of both DOE and the laboratories. Analysis of LDRD program data from the last few years indicates that the total estimated dollar value of those proposals that meet or exceed the selection criteria far exceeds the funding available at a 6 percent funding level. Each laboratory Director is responsible for final portfolio balance and project funding decisions.

In addition, the laboratories conduct reviews to assess technical progress and track project costs. In the post-performance stage, separate and independent external peer review advisory committees consisting of subject matter experts from academia and industry conduct peer reviews of LDRD projects as an integral part of the Department’s scientific program reviews. These scientific peer reviews are conducted for all technical divisions on a rotating basis as part of the contract mechanism and annual performance evaluation.

The various peer review and self-assessment processes described above are designed to ensure that the laboratories’ LDRD programs comply with DOE requirements, represent innovative and creative science, strengthen technical capabilities, and contribute to each institution’s pursuit of excellence in science and technology. The peer review process has evolved over several years of continuous improvement and is consistent with principles employed by other peer review processes performed by other agencies, such as the National Science Foundation and National Institutes of Health. The laboratories and DOE will continue to look for ways to improve these processes to enhance and strengthen the LDRD program.

Plant Directed Research, Development and Demonstration Program

Program Overview and Philosophy

The National Nuclear Security Administration (NNSA) Defense Programs (DP) Plant Directed Research, Development and Demonstration (PDRD) Program supports science-based manufacturing related to the NNSA weapons mission. Projects emphasize applied science and technology that enhance the manager's technology development capabilities and core competencies. Technical staff at the plants have the opportunity to explore innovative scientific and technological opportunities that hold high potential for payoff in mission applications.

The PDRD Program described in this document is consistent with Congressional intent as stated in the Energy and Water Development Appropriations Act for FY 2001 (Section 310) and the Defense Authorization Act for FY 2001 (Section 3165) which authorized the establishment of a Plant Managers Research, Development, and Demonstration Program at the following sites:

- The Kansas City Plant (KCP), Kansas City, Missouri,
- The Y-12 Plant (Y-12), Oak Ridge, Tennessee,
- The Pantex Plant, Amarillo, Texas, and
- The Savannah River Plant (SRP), Aiken, South Carolina.

The conference agreement allows for a maximum of two percent of the plants' NNSA operating budget to be utilized for the PDRD Program. The Authorization Act and Conference Report language instruct NNSA to establish and conduct an LDRD-type program for the nuclear weapons plants. The LDRD enabling legislation serves as a guide for the PDRD Program. The authorization basis for LDRD as defined by Section 3132(d) of the National Defense Authorization Act for FY 1991 and the policy and guidance contained in DOE Order 413.2A will be followed to the extent practicable.

By extension of the LDRD authorization basis, PDRD funds are to be used for research, development, and demonstration projects that are of a creative and innovative and potentially high value to the NNSA facility conducting the effort. The projects are selected by the Contractor Manager of a site for the purpose of maintaining or improving the vitality of the enterprise in mission-related scientific disciplines. The PDRD Programs provide the NNSA nuclear weapons plant managers the flexibility to invest in longer-term, higher-risk, and potentially higher-payoff research activities that enhance the science and technology capabilities of the plants.

In structuring the PDRD Program to enhance and maintain the "vitality" of the nuclear weapons plants, specific attention will be placed on the following areas:

- Retention and recruitment of individuals with knowledge, experience, and skills that are critical to the success of site operations today and in the future;
- Exploration of enhanced core competencies and achievement of new or improved capabilities required for current and future technical missions; and
- Replenishment of the pipeline of proven concepts that can improve or replace current practices, products and processes with developing and demonstrating innovative agile process technologies.

Individual programs at each site will be structured to incorporate Defense Program goals and will be consistent with the NNSA Strategic Plan and that site's corresponding goals and objectives for the future.

Program Description - Roles & Responsibilities

The PDRD Program is focused on relevant manufacturing-related technologies. It should be noted that the PDRD Program provides the site managers with broad flexibility for program implementation while NNSA's role is one of oversight and concurrence. Acting as the Cognizant Secretarial Officer designee, the Assistant Deputy Administrator for Military Applications and Stockpile Operations, through the applicable Federal Program Manager, has primary responsibility for the PDRD Program. The NNSA Site Offices are responsible to assure that their site's program plan and accounting practices are consistent with the intent of the implementing legislation, that the projects selected are representative of the NNSA and site's strategic mission, and that the results of promising projects are highlighted and transferred to other NNSA programs for further development.

Program Components

The PDRD Program at each of the four sites will consist of four main components:

1. A top level program planning process that results in identification of strategic manufacturing science and technology areas for targeted investment;
2. A call to plant scientific, engineering, manufacturing, and /or program management personnel for innovative and relevant proposals in the target investment areas;
3. A review process to select from the proposals a project portfolio for funding; and
4. A process for measuring and evaluating the program's effectiveness.

Fiscal Guidance

The maximum funding level established must not exceed 2 percent of the NNSA operating budget for the year as determined by Congress. The system of accrual of these funds shall, to the extent reasonable, provide for equitable contributions by all sources of NNSA funding. Construction line item and Work-for-Other projects are excluded. Expenditures shall be

considered an allowable cost in accordance with the terms and conditions of the operating contract and shall be identifiable and traceable within the accounting system for ease of annual certification.

PDRD funds may not be used to substitute for or supplement funding for any tasks or project required, planned, and budgeted by the NNSA or any other agency to meet current mission needs. PDRD funds may be used to fund conceptual or preliminary designs, but may not be used to fund any construction design (e.g. Title I). PDRD funds may be used to fund capital expenditures for acquisition of general-purpose equipment as long as the equipment is required to complete the project and would not otherwise be readily available from the plant inventory. PDRD funds may not be used to supplement a site's general capital equipment budget. Occasionally a small proportion of funds may be used to survey and evaluate the suitability of competing commercially available technical solutions in order to develop an optimum procurement recommendation.

The FY 2001 Energy and Water Development Appropriations Subcommittee Conference Report directed the Chief Financial Officer (CFO) to develop and execute a financial report of expenditures by site. The CFOs of the sites are responsible for preparing this report and it will include written assurance that the method for accumulating funds is consistent with DOE Order 413.2A. In addition, CFOs shall assure that cost information reported by their site is in agreement with the site financial records.

Defense Programs' Oversight of the Program

The purpose of program oversight is to ensure that each site carries out the objectives stated in the law enabling the Program. Site Offices review the plant program and processes to ensure that they adhere to NNSA policy and guidance, are consistent with DP mission needs, and recommend approval of the program plan for the upcoming year to the Program Manager.

As part of the appraisal of overall contractor performance, the Site Office will conduct an annual evaluation of the full spectrum of activities at the site. This evaluation spans all programmatic activities, and specifically includes an evaluation of the quality of the technical work, strategic alignment, and relevance to the NNSA missions. Technical program reviews to ensure that the PDRD Program and individual projects are in support of the NNSA mission are also conducted.

The Plants participating in the program will provide to their Site Office a proposed program plan for the upcoming fiscal year. Both the Site Office and the Federal Program Manager will review and analyze the plan, taking into account NNSA policy, alignment with guidance, mission relevance, strategic planning, operational needs, and general program performance. Additionally, each site's proposed plan and requested program funding level is evaluated against Congressional requirements regarding support of NNSA's national security mission. The Program Manager assembles the annual PDRD program plan which includes the individual site

plans, and submits it to the cognizant Secretarial Officer or designee along with a recommendation on the plan and the program funding level. At the start of the fiscal year, the cognizant Secretarial Officer or designee assesses the plan and the Program Manager's recommendation and makes the final decision to approve the program plan.

Plants participating in the program will propose projects for review by the Site Office and the Program Manager. Site Office and Program Manager concurrence is required prior to initiating work on any project. Throughout the fiscal year, the Site Office works closely with their site by reviewing any proposed modifications or adjustments to the program for adherence to NNSA guidelines and the site's program plan, and notifying the Program Manager of any potential issues.

Fiscal Year 2004 PDRD Program Expenditures

The following table shows FY 2004 PDRD program expenditures by site. It should be noted that the table includes all PDRD costs including individual project costs listed in Note 1 and any administrative costs not specifically assigned to individual FY 2004 projects, if applicable.

Plant	NNSA/DP Funding (\$M)	PDRD Costs (\$M)	PDRD Fraction
KCP	\$374.9	\$5.1	1.36%
Pantex	\$438.5	\$2.4	.55%
SRP	\$133.1	\$2.7	2.00%
Y-12	\$589.3	\$9.9	1.68 %

Site Directed Research, Development and Demonstration

Program Overview and Philosophy

The National Nuclear Security Administration (NNSA) Defense Programs (DP) Nevada Test Site Directed Research, Development and Demonstration (SDRD) program supports technology development related to the NNSA weapons mission. The program is administered by the Management and Operations contractor for the Nevada Test Site (NTS). Technical staff at NTS operational sites has the opportunity to explore innovative scientific and technological opportunities that hold high potential for payoff in mission applications.

Section 310 of Public Law 107-66, the Energy and Water Development Appropriations Act for FY 2002 states *“The Administrator of the National Nuclear Security Administration may authorize the manager of the Nevada Operations Office to engage in research, development, and demonstration activities with respect to the development, test, and evaluation capabilities necessary for operations and readiness of the Nevada Test Site: Provided, That of the amount allocated to the Nevada Operations Office each fiscal year from amounts available to the Department of Energy for such fiscal year for national security programs at the Nevada Test Site, not more than an amount equal to 2 percent of such amount may be used for these activities.”*

Furthermore, the Act and accompanying Conference Report authorizes NNSA to establish and conduct an LDRD-type program for the nuclear weapons plants. The LDRD enabling legislation serves as a guide for the SDRD program. The authorization basis for LDRD is defined by Section 3132(d) of the National Defense Authorization Act for FY 1991, and the policy and guidance contained in DOE Order 413.2A will be followed to the extent practicable.

By extension of the LDRD authorization basis, SDRD represents research, development and demonstration work of a creative and innovative nature selected by a senior management committee for the purpose of maintaining the vitality of the Site in mission-related scientific disciplines. SDRD provides Nevada Test Site managers the flexibility to invest in longer-term, higher-risk, and potentially higher-payoff research activities that enhance the science and technology capabilities.

In structuring the SDRD program to enhance and maintain the “vitality” of the NTS and the technical base for carrying out the NTS DP mission, specific attention will be placed on the following areas:

- Retention and recruitment of individuals with critical skills;
- Maintenance of core competencies required for current and future technical missions; and
- Developing and demonstrating innovative, agile technology to replace outdated technology.

The program will be structured to incorporate NNSA National Security Response and Defense Programs' goals and will be consistent with the NNSA Strategic Plan.

Program Description - Roles & Responsibilities

The SDRD program is analogous to the LDRD program with appropriate differences to assure the program is focused on instrumentation and diagnostic technologies critical to the performance of the NTS stockpile stewardship and nuclear security response missions. The main elements and responsibility matrix for the SDRD program is given below. It should be noted that the SDRD program, like the LDRD program, provides NTS with broad flexibility for program implementation and NNSA's role is one of limited oversight and concurrence. Acting as the Cognizant Secretarial Officer designee, the Assistant Deputy Administrator for Research, Development and Simulation, through the DP Program Manager, has primary responsibility for the SDRD program. The Federal Site Office at NNSA/Nevada is responsible for implementation and oversight.

Program Components

The SDRD program will consist of three main components:

1. A top level program planning process that results in identification of strategic science and technology areas for targeted SDRD investment;
2. A call to scientific, engineering, and /or other technical personnel for innovative and relevant proposals in the target SDRD investment areas; and
3. A review process to select from the proposals a SDRD project portfolio for funding.

Program Planning. The SDRD program will use appropriate strategic plans and DP goals to identify strategic technology needs and establish SDRD objectives to address near-term, mid-term and long-term competence for assigned missions.

Call for Employee-suggested Proposals. Once the strategic direction is established, a call for proposals will be issued to the NTS scientific and engineering community. This broad-based call for proposals will result in participation of numerous scientists, engineers, and technicians yielding numerous innovative approaches to meeting the strategic SDRD objectives.

Review and Selection of Proposals for funding. All proposals are subject to two types of review, a technical review by scientists, engineers, and program management personnel, and an operational management review. The technical review is performed against criteria that include an evaluation of the proposal's balance of innovation, impact, and risk with programmatic and strategic relevance. The management review includes participation by senior functional and programmatic management to select sound technical proposals that are aligned with the strategic goals and objectives of the NTS mission.

Fiscal Guidance

The maximum funding level established for SDRD must not exceed 2 percent of the NNSA operating budget for the year as determined by Congress. Construction line item projects are excluded. SDRD expenditures shall be considered an allowable cost in accordance with the terms and conditions of the operating contract and shall be identified in the accounting system.

The FY 2001 Energy and Water Development Appropriations Subcommittee Conference Report directed the Chief Financial Officer (CFO) to develop and execute a financial report of SDRD expenditures by project. The CFOs of the Sites are responsible for preparing this report and it will include written assurance that the method for accumulating SDRD funds is consistent with DOE Order 413.2A. In addition, CFOs shall assure that cost information reported by their Site is in agreement with the NTS financial records.

Defense Programs Oversight of the SDRD program

The SDRD oversight activities ensure that NTS carries out the objectives stated in the law enabling the Program. SDRD oversight is managed through the NNSA/NSO in a process that is consistent with the LDRD oversight process. The Site Office reviews the program and process to ensure that it adheres to NNSA policy and guidance, is consistent with DP mission needs, and recommends approval of the SDRD program plan for the upcoming year to the DP Program Manager.

As part of the appraisal of overall contractor performance, NNSA/NSO will conduct an annual evaluation of SDRD activities at NTS. This evaluation looks at the quality of the technical work, strategic alignment, and relevance to the NNSA missions. This annual evaluation relies heavily on the NTS self-assessment process. The result of this evaluation is additional input for DP in the assessment of the value and level of funding for the SDRD activities.

Technical program reviews to ensure that the SDRD program and individual projects are in support of the NNSA mission will be conducted in conjunction with LDRD working group meetings. Due to the similarities between the SDRD program and the Plant Directed Research Development and Demonstration (PDRD) program, SDRD Managers will also participate, when feasible, in PDRD working group meetings. The NTS SDRD Program Manager will schedule all Principal Investigators to present their work at least once during the life of their project.

Nevada Test Site will submit to NNSA/NSO and DP, a proposed SDRD program plan for the upcoming fiscal year. Both the Site Office and the DP Program Manager will review and analyze the plan, taking into account NNSA policy, alignment with guidance, mission relevance, strategic planning, operational needs, and general program performance. In coordination with the DP Program Manager, the Site Office resolves any outstanding issues with the proposed plan and provides a recommendation to the Cognizant Secretarial Officer or designee on the plan and the program funding level. Prior to the beginning of a new fiscal year, the Cognizant Secretarial Officer or designee assesses the information submitted by the sites and issues a memorandum

approving the SDRD program plan and the maximum percent of the site's operating budget that may be used to fund the program.

NNSA/NSO concurrence is required prior to initiating work on an SDRD project.

Fiscal Year 2004 SDRD Program Expenditures

The following table shows FY 2004 SDRD program expenditures. It should be noted that the table includes all SDRD costs including individual project costs listed in Note 1 and any administrative costs not specifically assigned to individual FY 2004 projects.

Site	NNSA Funding (\$M)	SDRD Costs (\$M)	SDRD Fraction
NTS	\$305.8	\$5.5	1.80%