

THE
ECONOMIC IMPACT
OF BROOKHAVEN NATIONAL LABORATORY
ON THE NEW YORK STATE ECONOMY



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The Economic Impact of Brookhaven National Laboratory On the New York State Economy

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Brookhaven National Laboratory's Economic Impact on the New York State Economy — Highlights

TOTAL IMPACT

Brookhaven National Laboratory is among the five largest high-technology employers on Long Island, with 2,750 employees, including a high proportion of scientists, engineers and technicians.

- In fiscal years 1993-2003, the Lab's employees injected more than \$4.76 billion in direct spending into the New York State economy. This increased the state's output of goods and services by almost \$9.2 billion, and created almost 79,000 secondary jobs in the state.

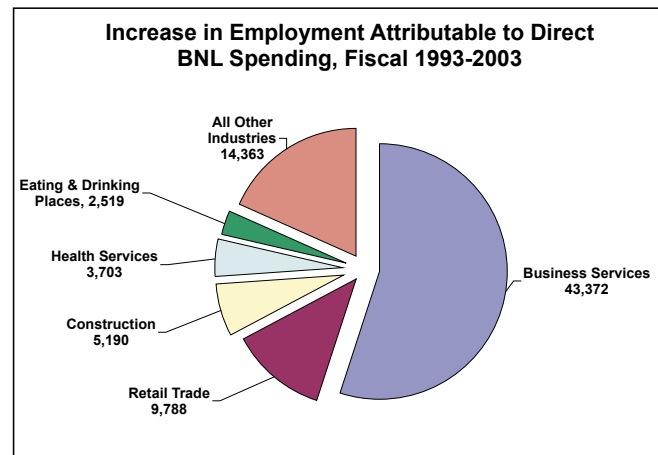
VISITING RESEARCHERS

BNL annually hosts an estimated 3,500 visiting scientists who use the Lab's world-class facilities to advance their research. More than 30% of the visiting scientists are from New York State universities and businesses. These scientists and their families generally reside on-site at BNL or in surrounding communities for extended periods of time, further helping to fuel the regional and statewide economy.

MORE VALUE ADDED . . .

- Over the last five fiscal years, Brookhaven's procurement expenditures totaled an estimated \$223 million in New York State, with more than \$100 million spent for goods and services on Long Island. In fiscal year 2004 alone, the Lab's procurement expenditures in New York State totaled approximately \$41.6 million, with an estimated \$27 million going to Long Island businesses.
- Laboratory direct spending of \$454.4 million in fiscal year 2004 caused New York State's total output of goods and services to expand by more than \$880 million, and created more than 7,700 secondary jobs throughout the state.

- The Lab invites industry to develop and market the inventions it has patented. Of the 162 inventions in Brookhaven Science Associates' (BSA) patent portfolio over the last fifteen years, 96 were licensed and 63 were commercialized in the fields of molecular biology, pharmaceuticals, instrumentation, environmental technologies, and electronics – industries that New York is relying on to form the core of a growing technology base.



Brookhaven Science Associates' Patent Portfolio			
Technology Field	Inventions in Portfolio	Inventions Licensed	Inventions Commercialized
Optics	39	39	39
Molecular Biology	24	12	6
Pharmaceuticals	26	16	3
Instrumentation	13	8	4
Materials	14	4	0
Environmental Technologies	20	13	7
Medical Devices	10	0	0
Catalysts	10	0	0
Electronics	4	4	4
Nanofabrication	2	0	0
Total	162	96	63

Source: Brookhaven National Laboratory

Brookhaven National Laboratory's continued viability as a premier research facility is critical to New York State's future economic growth.

Projected spending for the fiscal 2005 through 2014 period could total almost \$5.6 billion... more than 91,000 jobs would be created statewide.

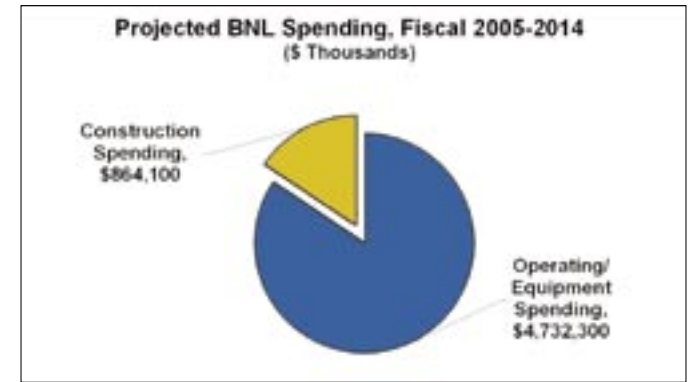
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- Brookhaven Lab's cooperative research and development agreements (CRADAs) with local industry allow these firms to use BNL's unique equipment and technical staff. These CRADAs are funded largely by the U.S. Department of Energy (DOE). During the fiscal 2000-2004 period, DOE funding for Brookhaven Lab's CRADA program totaled \$5.5 million.
- The Laboratory has become an invaluable resource in counter-terrorism planning and implementation. Researchers have developed an extensive portfolio of national security technologies that are applicable nationally, regionally and locally.
- Brookhaven's research to improve fuel-oil efficiency has saved approximately \$6 billion in the past decade for the 10 million U.S. homes and businesses that are heated by oil. Any research that results in greater fuel-oil efficiency will be a boon to both the state's economy and that of the nation.
- The Laboratory's educational programs involve nearly 24,000 K-12 students annually, with New York State participants representing at least 90% of this total. Since the late 1990s, over 550 New York State teachers have participated in these programs. More than 100 undergraduate student interns come to BNL each year from across the country; 45% of these interns are from communities in New York State.

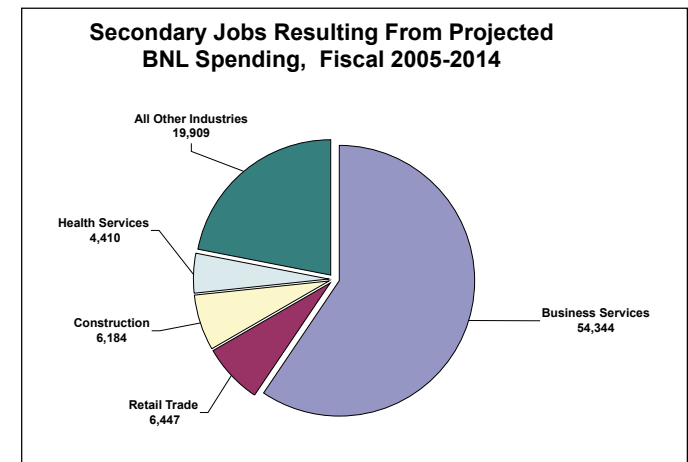
A LOOK to the FUTURE...

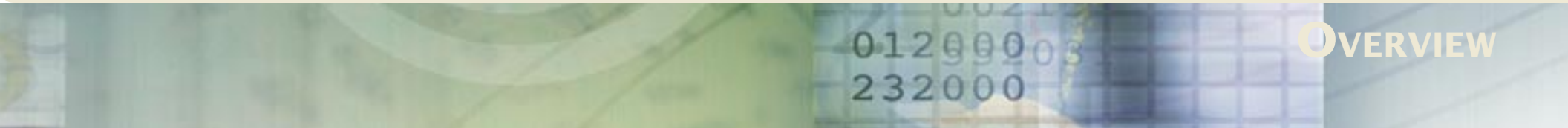
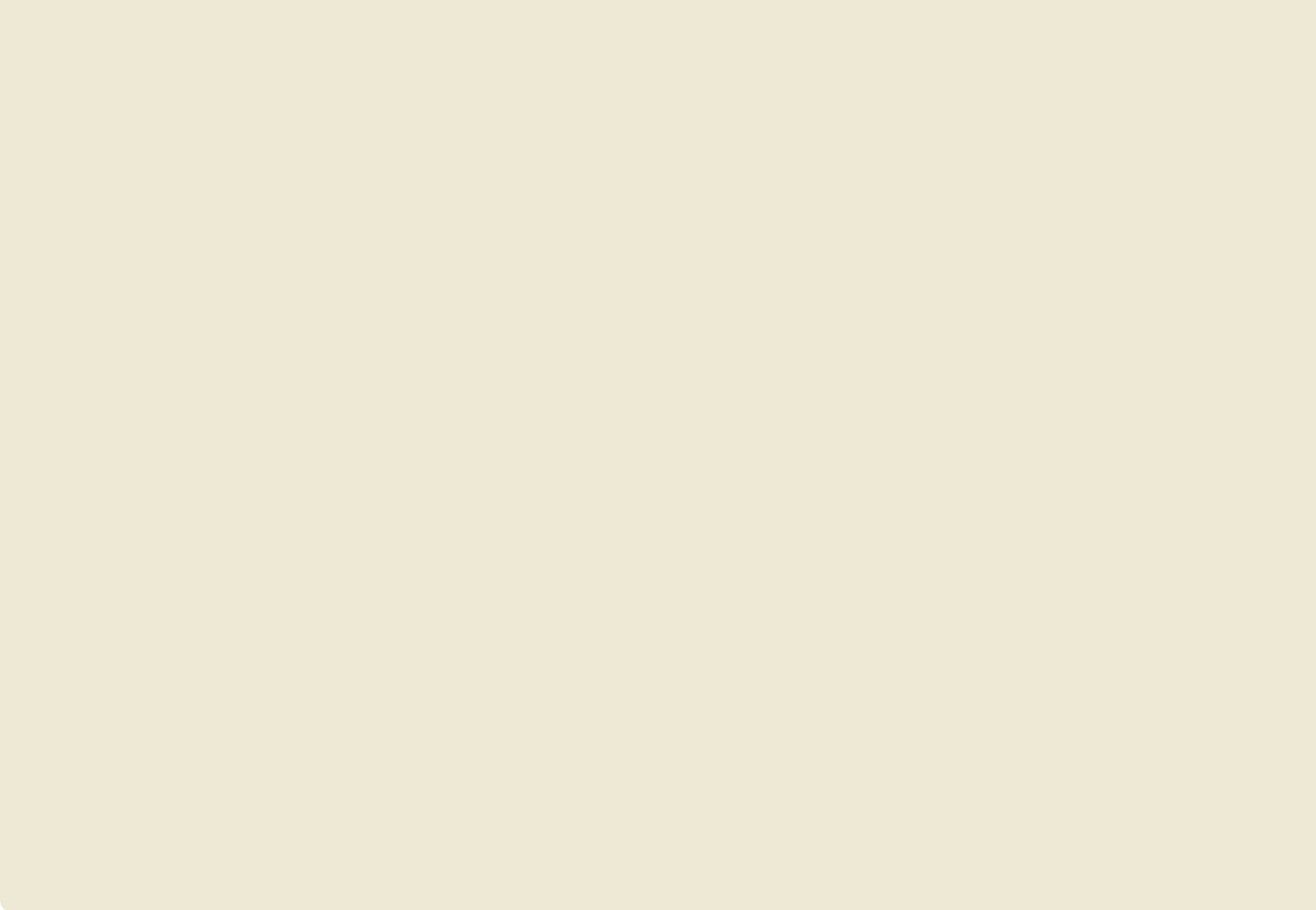
Several planned projects will significantly enhance the Laboratory's economic value to New York State. The new Center for Functional Nanomaterials (CFN) will help to jump-start New York State's nanotechnology industry, and the upgraded National Synchrotron Light Source (NSLS-II) will facilitate the commercialization of nanoscale discoveries.

Projected spending for the fiscal 2005 through 2014 period could total almost \$5.6 billion. This includes more than \$4.7 billion in operating and equipment expenditures and approximately \$864 million in construction spending. More than 91,000 jobs would be created statewide, and virtually all industries, including some of the state's key manufacturing industries, would benefit from this spending.



Operating/Equipment Spending	4,732,300
Construction Spending	864,100





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 OVERVIEW

An Overview of Brookhaven National Laboratory

Brookhaven National Laboratory is one of ten national laboratories owned and primarily funded by the Office of Science of the U.S. Department of Energy (DOE). BNL is managed for DOE by Brookhaven Science Associates (BSA), a limited-liability company founded by Stony Brook University, the largest academic user of Laboratory facilities, and Battelle, a nonprofit, applied science and technology organization. Home of six Nobel Prize winning discoveries, BNL is a multi-disciplinary research institution built around unique scientific facilities that are available for use by industry, academic institutions, and other laboratories. Several projects now on the drawing boards will significantly enhance BNL's economic value to New York State.

National Synchrotron Light Source

Some 2,400 visiting researchers conduct experiments at the National Synchrotron Light Source (NSLS) each year, with over 30% representing universities and businesses in New York State. These users rely on the NSLS's powerful beams of x-rays, ultraviolet light and infrared light to study all types of materials, from computer chips to biological molecules. Most conduct research in the fields of materials and life sciences. Both fields will be at the heart of future technology growth in New York State. Ongoing research at the NSLS is expected to lead to advances in high-temperature superconductors, magnetic materials for digital information storage, and pharmaceutical development based on specific protein structures. It is also expected to lead to a better understanding at the atomic level of how genes cause disease. Armed with this knowledge, researchers may be able to develop new cures for diseases that are currently untreatable. (A list of New York State-based institutional users of the Laboratory's NSLS in fiscal years 2003 and 2004 appears in Appendix A.)

NSLS-II

Within the next several years the Laboratory is planning to build a new Light Source, NSLS-II. The NSLS-II will produce x-rays that are 10,000 times brighter than those produced currently by the NSLS. The NSLS-II will focus on some of the most important challenges on the nanoscale that could lead to high-efficiency and low-cost materials for hydrogen production and solar energy, cheaper electronics that consume less power, and more efficient superconductors that could dramatically improve the efficiency of energy transmission. If the Lab's plans for the NSLS-II are approved, the facility will be operational in 2013. *More than 200 new positions* will be created as a result of this project.

Center for Functional Nanomaterials

BNL's planned Center for Functional Nanomaterials (CFN) will provide researchers with state-of-the-art capabilities to fabricate and study nanoscale materials. These materials, on the scale of billionths of a meter, offer different chemical and physical properties than bulk materials, and could form the basis of new technologies around which new industries will be created.

The CFN is one of five research centers to be located at national laboratories supported by the Department of Energy's Office of Science, as part of the National Nanotechnology Initiative. As the only DOE-supported nanoscience center in the Northeast, the CFN will facilitate collaborations between the Lab and nearby university partners, such as Columbia, Stony Brook, Princeton, and Cornell. *Approximately 80 jobs* will be created as a result of this project, which began construction in October 2005.

With Brookhaven's NSLS-II and CFN, and other nanoscience research centers in New York, the state will have

Several projects now on the drawing boards will significantly enhance BNL's economic value to New York State.

Two new Brookhaven facilities will allow researchers to develop new nanoscale materials at the CFN and then explore their characteristics at the NSLS-II, thus providing New York State with a distinct competitive edge in developing new technologies at the interface of the physical and life sciences.

an opportunity to build on its Centers of Excellence program and position itself as a leader in the design and fabrication of new nanoscale materials. The combination of these two new Brookhaven facilities will allow researchers to develop new nanoscale materials at the CFN and then explore their characteristics at the NSLS-II, thus providing New York State with a distinct competitive edge in developing new technologies at the interface of the physical and life sciences.

Relativistic Heavy Ion Collider

BNL built and currently operates the premiere nuclear physics facility in the world, the Relativistic Heavy Ion Collider (RHIC), to study the fundamental properties of matter from elementary atomic particles to the evolution of the universe. The key to new discoveries in this field is to accelerate heavy ions and collide them at high energies to mimic the hot, dense condition of the early universe. This \$600-million facility, operational since 2000, contains over 1,700 superconducting magnets designed, developed, and tested by the Laboratory. Most of these magnets were manufactured by or with assistance from industrial partners, including Northrop Grumman Corporation of Bethpage, N.Y. More than 1,000 international scientists use RHIC's unique capabilities to explore the nature of matter at the beginning of the universe. Brookhaven has proposed two upgrades to RHIC that will allow scientists to expand the facility's scientific mission and lengthen its lifespan. (A list of New York State-based institutional users of BNL's RHIC facility in fiscal year 2004 appears in Appendix B.)

Brookhaven Center for Translational Neuroimaging

The Brookhaven Center for Translational Neuroimaging is dedicated to understanding the relationships between genes, the brain and major health problems, such as drug addiction and obesity, and to learn the effects of Parkinson's and Alzheimer's diseases and aging on the human brain. To conduct this research, the Lab uses a

network of complementary brain imaging tools including positron emission tomography (PET), magnetic resonance imaging (MRI), and single photon emission computed tomography (SPECT), among others, all located on the Laboratory site.

Computational Science Center

BNL, in collaboration with IBM and Columbia University, plans to provide computational science capabilities through the use of extremely sophisticated and powerful computers to capture, store and analyze data for researchers in biology, chemistry, physics, applied mathematics, medicine and nanoscience. Initially the Computational Science Center will be used to accommodate research conducted at the Center for Functional Nanomaterials and also for research in computational biology, the exciting new field dedicated to advancing our understanding of complex living systems.

National Security and Counter-Terrorism

BNL has become an invaluable resource in counter-terrorism planning and implementation. The Laboratory has built close working relationships with counter-terrorism and emergency response agencies in New York State, particularly in nearby New York City. Its researchers have also developed an extensive portfolio of national security technologies in areas that include: safeguarding nuclear materials; developing sensors for detection of nuclear weapons, dirty bombs, toxic chemicals, biological pathogens, and explosives; and designing tools and approaches for identifying, characterizing, and managing risk in various environments.

Energy Research

BNL is researching technologies to reduce environmental contaminants associated with energy production and to increase energy conservation. Examples of this research include: natural gas and hydrogen vehicle storage systems; advanced, clean liquid fuels, such as heating oil with ultra-low sulfur and nitrogen contents, and liquid

biofuels; advanced oil burner systems that offer increased efficiency and reduced air pollution emissions relative to conventional burners; cogeneration; and advanced heating equipment and improved heating systems in buildings. Brookhaven's research to improve fuel-oil efficiency has saved approximately \$6 billion in the past decade for the 10 million U.S. homes and businesses that are heated by oil. Any research that results in greater efficiency will be a boon to both the state's economy and that of the nation.

Environmental Sciences

BNL is exploring ways to preserve nature, clean up environmental pollutants, and understand how the earth's atmosphere works. BNL's environmental programs include atmospheric physics and chemistry, carbon cycle research, plant ecology, and bioremediation. Lab scientists are studying air quality and pollutant transport in the Northeast, part of a nationwide effort to understand aerosol pollutants and evaluate their effects on the Earth's climate. Other BNL researchers are determining the extent of sediment contamination in the New York/New Jersey Harbor and overseeing the development and testing of new options for cleaning the harbor and its sediment. The Laboratory is also collaborating with the Department of Homeland Security on a program aimed at modeling the dispersion of particles in Manhattan's urban canyons, which will help determine how an airborne hazard might move through the city and the environment in the event of a terrorist attack.

Education and Workforce Development Programs

Brookhaven's educational programs contribute to New York State's work-force development by providing opportunities for elementary, middle school and high school teachers to participate in ongoing research activities in four-week workshop and eight-week internship programs. Additionally, from the late 1990s through the present, BNL has partnered with local universities to im-

prove the math, science and technology knowledge and research skills of elementary and middle school teachers in underachieving local districts. Over 500 New York State teachers have participated in the elementary program that concluded in 2003; another 50 middle school teachers are engaged in the current program.

The Lab's educational programs involve nearly 24,000 K-12 students annually, with New York State participants representing more than 90%. The Lab also hosts over 100 undergraduate student interns each year from across the country. Approximately 45% of these interns are from communities across New York State. All these interns conduct hands-on research with Brookhaven scientists, and most participate in developing published work. These programs create positive experiences and highlight career opportunities throughout the region. (A detailed description of these programs, along with the number of participants from 1995-2004, appears in Appendix C.)

*Initially the
Computational Science
Center will be used to
accommodate research
conducted at the Center for
Functional Nanomaterials
and also for research in
computational biology.*

The background of the slide features a collage of Euro banknotes and a line graph. The banknotes are in shades of yellow and green, with some numbers like '230001', '125034', and '2250' visible. The line graph shows a fluctuating trend with several peaks and troughs.

ECONOMIC IMPACT OF BNL SPENDING: FISCAL 1993-2003

Economic Impact of BNL Spending: Fiscal Years 1993-2003

Brookhaven National Laboratory is among the five largest high-technology employers on Long Island with 2,750 employees, including a high proportion of scientists, engineers and technicians. In addition, the Lab annually hosts an estimated 3,500 visiting scientists who use the Lab's world-class facilities to advance their research, with more than 30% coming from New York State academic institutions and businesses.

By virtue of its world-class research, the Lab consistently draws outside funding to New York State. Much of this funding comes from the U.S. Department of Energy. BNL's research is critical to the future economic development within New York State. Its groundbreaking discoveries will continue to give the state the competitive edge it needs in building a technology-based economy. However, Brookhaven Lab is also a major economic entity in and of itself. Its expenditures help fuel the regional and statewide economy. Direct spending by BNL and its users totaled more than \$4.76 billion between fiscal 1993 and fiscal 2003. Direct spending refers to actual expenditures by BNL.

*BNL's research
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Direct Expenditures by BNL, Fiscal 1993 Through 2003 (\$000)						
Year	Operating Expenditures	Capital Expenditures	Capital Equipment	Capital Construction	User Spending*	Total Spending
1993	\$283,500	\$107,000	\$26,900	\$80,100	\$6,000	\$396,500
1994	285,000	125,300	21,600	103,700	6,500	416,800
1995	296,700	149,400	21,500	127,900	7,000	453,100
1996	302,200	144,500	22,500	122,000	7,500	454,200
1997	309,600	112,800	19,600	93,200	8,000	430,400
1998	301,300	111,100	24,200	86,900	9,000	421,400
1999	334,200	64,800	26,200	38,600	9,800	408,800
2000	366,600	45,100	28,200	16,900	13,800	425,500
2001	385,300	57,100	40,300	16,800	12,300	454,700
2002	391,200	50,600	33,300	17,300	10,400	452,200
2003	391,200	46,500	28,300	18,200	9,700	447,400
Total	3,646,800	1,014,200	292,600	721,600	100,000	4,761,000

*Includes miscellaneous expenses incurred by external users in support of their work at BNL.

Note: Fiscal years end on September 30.

Source: Brookhaven National Laboratory

Secondary Impact of BNL Spending of \$4.76 Billion on All Industries, Fiscal 1993-2003			
Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$34,967,580	\$12,465,900	626
Construction	819,652,180	217,486,040	5,190
Manufacturing	424,449,620	95,767,700	2,164
Transportation	155,682,680	53,158,280	1,528
Communications	144,137,420	27,497,480	330
Utilities	99,250,880	16,784,740	183
Wholesale Trade	247,657,060	68,708,740	1,311
Retail Trade	657,015,560	214,731,300	9,788
Finance	334,505,680	84,569,940	1,105
Insurance	155,021,160	45,225,540	794
Real Estate	666,400,040	29,499,320	963
Hotels & Tourist Accommodations	79,471,700	23,485,600	1,118
Personal Services	50,568,980	19,867,740	1,120
Business Services	4,589,681,480	1,947,923,780	43,372
Eating & Drinking Places	131,262,920	39,855,000	2,519
Health Services	372,030,800	151,296,320	3,703
Miscellaneous Services	226,793,860	66,542,140	2,759
Households	--	4,558,160	362
Total	9,188,549,600	3,119,423,720	78,935

Secondary Economic Impact of BNL Spending on Specific Manufacturing Industries, Fiscal 1993-2003			
Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$34,566,820	\$5,020,620	144
Textiles & Apparel	17,483,280	2,784,440	95
Paper	35,406,700	5,412,660	134
Printing & Publishing	95,067,860	27,267,100	547
Chemicals	52,751,880	9,260,640	106
Rubber & Plastics	23,957,600	4,719,360	130
Lumber	8,584,460	1,789,100	62
Stone, Clay & Glass	20,286,040	5,194,260	118
Primary & Fabricated Metals	40,869,660	10,246,180	278
Industrial Machinery	28,323,040	8,608,740	197
Electronics & Electrical Machinery	37,128,240	8,438,160	179
Transportation Equipment	4,446,820	981,460	17
Instruments	13,658,860	2,798,080	57
Miscellaneous Manufacturing	11,918,360	3,246,900	100
Total	424,449,620	95,767,700	2,164

Source: Consultant's computations based on RIMS II multipliers

Secondary Economic Impact of BNL Spending: Fiscal 1993-2003

All Lab spending was injected into the state's economy and underwent several rounds of respending, so that its ultimate economic impact was a multiple of the original expenditure. This is the so-called "multiplier" or "ripple" effect. For example, employee wages are spent in local supermarkets, which in turn purchase merchandise from businesses throughout the state. As a result, the ultimate impact of direct spending by BNL and its users is a multiple of the original expenditure. The secondary economic impact measures the multiplier or ripple effect.

It is possible to quantify the secondary impact of BNL's economic contribution to New York State by using an input-output model of the state's economy. The U.S. Bureau of Economic Analysis has developed one such model, known as the Regional Input-Output Modeling Systems or RIMS II. For each major industry sector, it shows the industries from which inputs are purchased and to which outputs are sold. In effect, it traces inter-industry linkages throughout the economy. The model contains multipliers for output, earnings and employment.

Results aggregated to determine the overall economic impact of Brookhaven National Laboratory on New York State's economy between fiscal 1993 and fiscal 2003 showed that total spending of \$4.76 billion during this period caused the state's output of goods and services to increase by almost \$9.2 billion. This was equivalent to a net output increase of more than \$4.4 billion. Statewide earnings increased by more than \$3.1 billion, and *almost 79,000 secondary jobs* were created throughout the state's economy. The greatest impact occurred in business services, a dynamic and growing sector of the state's economy. However, there were also substantial positive impacts in other industries, notably construction, retail trade and real estate. BNL spending also helped the state's hard-hit manufacturing industry. Within manufacturing, the greatest impact occurred in the printing and publishing and chemical industries. *It should be noted that the multipliers used in this analysis work downward as*

well as upward. That is, without BNL, the state's overall economic output would have declined by almost \$9.2 billion during the study period.

Secondary Economic Impact of BNL Spending, by Type of Expenditure: Fiscal 1993-2003

Operating and User Expenditures

The injection of nearly \$3.7 billion in BNL operating expenditures into the state's economy between fiscal 1993 and fiscal 2003 caused the total output of goods and services to expand by \$7 billion including the original expenditure. This is equivalent to a net output increase of more than \$3.4 billion. Earnings increased by more than \$2.5 billion and almost 62,000 support jobs were created throughout the economy. The greatest impact occurred in business services, but virtually all industries benefited, including the state's hard-pressed manufacturing sector. (See Appendix D, Table D-1 for the impacts on major industry sectors and Table D-2 for specific manufacturing industries.)

Visiting researchers who used BNL facilities injected approximately \$100 million into the state's economy between fiscal 1993 and fiscal 2003. These expenditures generated a gross output increase of \$194.4 million and a net output increase of \$94.4 million. Earnings increased by more than \$69 million, and almost 1,700 secondary jobs were created. (See Appendix E, Table E-1 for the impacts on major industry sectors and Table E-2 for specific manufacturing industries.)

Capital Expenditures: Equipment and Construction

BNL equipment spending totaled \$292.6 million between fiscal 1993 and fiscal 2003. These expenditures generated an output increase of almost \$543.4 million including the original expenditure. This was equivalent to a net output increase of \$280.8 million. Earnings rose by almost \$160 million, and some 6,200 secondary support jobs were created. The greatest impact occurred in

retailing. (See Appendix F, Table F-1 for the impacts on major industry sectors and Table F-2 for specific manufacturing industries.)

BNL's construction expenditures totaled \$721.6 million between fiscal 1993 and fiscal 2003. This spending caused a gross output increase of more than \$1.36 billion and a net output increase of almost \$538.7 million. As a result of this spending, earnings rose by \$365 million, and almost 9,500 secondary support jobs were created. The greatest impact occurred in construction, manufacturing and business services. (See Appendix G, Table G-1 for the impacts on major industry sectors and Table G-2 for specific manufacturing industries.)

“...discoveries will continue to give the state the competitive edge it needs in building a technology-based economy.”

The background of the slide is a blurred image of a financial document. It features various numbers, including integers like '21' and '2', and fractions such as '17 1/4', '103/4', '5 1/4', '1/8', and '66 1/4'. A line graph with several data points is also visible, overlaid on the document. The overall tone is light and professional.

ECONOMIC IMPACT OF BNL SPENDING: FISCAL 2004

Economic Impact of BNL Spending: Fiscal 2004

Expenditures by Brookhaven National Laboratory in any given fiscal year have a discernible positive impact on New York State's economy. This section documents the impact of fiscal 2004 Laboratory expenditures. Laboratory spending totaled \$454.4 million in fiscal 2004. Operating expenditures accounted for 88% of this amount.

Secondary Economic Impact of BNL Spending: Fiscal 2004

Direct spending of \$454.4 million by Brookhaven National Laboratory in Fiscal 2004 caused the total output of goods and services to expand by more than \$880 million. This was equivalent to a net output increase of almost \$426 million. Earnings increased by more than \$308 million and *more than 7,700 secondary jobs* were created throughout the economy. Firms providing various business services experienced the greatest beneficial impact from this spending. Within manufacturing, the greatest positive impact on the state's economy occurred in the paper and printing and publishing industries. There were also significant benefits to the chemicals, food and electronics industries. ***It should be noted that the multipliers used in this analysis work downward as well as upward. That is, without BNL, the state's overall economic output would have declined by \$880 million during fiscal 2004.***

*Without BNL,
the state's overall
economic output
would have
declined by \$880
million during
fiscal 2004.*

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Brookhaven National Laboratory Expenditures, Fiscal 2004, by Category*	
Category	Expenditures (\$)
Operating	\$402,200,000
Capital	40,800,000
Equipment Purchases/Fabrications	27,100,000
Construction	13,700,000
User Spending*	11,400,000
Total	454,400,000

*Includes miscellaneous expenses incurred by external users in support of their work at BNL.

Note: Fiscal years end on September 30.

Source: Brookhaven National Laboratory

Secondary Economic Impact of BNL Spending of \$454.4 Million, Fiscal 2004			
Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$3,261,050	\$1,112,450	56
Construction	23,572,620	6,527,480	158
Manufacturing	36,480,310	8,167,280	180
Transportation	15,104,580	5,201,590	149
Communications	14,369,760	2,740,360	34
Utilities	9,829,490	1,661,420	18
Wholesale Trade	22,496,550	6,239,700	119
Retail Trade	61,129,320	19,979,640	911
Finance	32,919,180	8,331,170	109
Insurance	14,732,320	4,295,180	75
Real Estate	66,335,120	2,945,740	96
Hotels & Tourist Accommodations	7,878,760	2,330,120	111
Personal Services	4,974,960	1,951,060	111
Business Services	495,205,360	210,808,610	4,691
Eating & Drinking Places	13,034,780	3,959,730	249
Health Services	36,746,920	14,948,050	365
Miscellaneous Services	22,241,970	6,524,020	271
Households	0	446,240	36
Total	880,313,050	308,169,840	7,739

Secondary Economic Impact of BNL Spending of \$454.4 Million on Specific Manufacturing Industries, Fiscal 2004			
Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$3,420,590	\$495,730	14
Textiles & Apparel	1,702,240	271,270	9
Paper	3,381,420	516,100	13
Printing & Publishing	9,542,890	2,742,900	54
Chemicals	5,069,590	895,220	10
Rubber & Plastics	1,761,200	350,870	9
Lumber	670,440	143,170	5
Stone, Clay & Glass	877,520	203,510	4
Primary & Fabricated Metals	1,660,330	415,090	11
Industrial Machinery	2,507,240	794,960	18
Electronics & Electrical Machinery	2,944,300	656,890	13
Transportation Equipment	429,270	93,590	2
Instruments	1,331,960	267,220	5
Miscellaneous Manufacturing	1,181,320	320,760	13
Total	36,480,310	8,167,280	180

Source: Consultant's computations based on RIMS II multipliers

Secondary Economic Impact of BNL Spending, by Type of Expenditure: Fiscal 2004

Operating and User Expenditures

Application of RIMS II multipliers to the \$402.2 million in Laboratory operating expenditures during fiscal 2004 shows that this expenditure resulted in an increase in the output of goods and services totaling about \$782 million including the original expenditure. This is equivalent to a net output increase of over \$379.8 million. Earnings increased by almost \$279 million and *almost 6,800 secondary jobs* were created throughout the economy. Most of the beneficial impact occurred among firms providing various business services. (See Appendix Tables H-1 and H-2 for secondary impacts on major industry sectors and specific manufacturing industries.)

Application of the multipliers to the \$11.4 million in user expenditures in fiscal 2004 results in a gross output increase of \$22.1 million, a net output increase of more than \$10.7 million and an earnings increase of almost \$7.9 million. *Almost 200 secondary jobs* were created as a result of this spending. (See Appendix Tables I-1 and I-2 for secondary impacts on major industry sectors and specific manufacturing industries.)

Capital Expenditures: Equipment and Construction

Injection of \$27.1 million in equipment purchases into the economy in fiscal 2004 caused the total output of goods and services within New York State to expand by more than \$50.3 million, including the original expenditure. This was equivalent to a net output increase of \$23.2 million. Earnings increased by \$14.7 million and *571 secondary support jobs* were created throughout the economy.

(See Appendix Tables J-1 and J-2 for impacts on major industry sectors and specific manufacturing industries.)

Injection of \$13.7 million in construction spending into the economy in fiscal 2004 caused the total output of goods and services to expand by more than \$25.8 million, including the original expenditure. This is equivalent to a net output increase of more than \$12.1 million. Earnings increased by more than \$6.9 million and 180 secondary support jobs were created throughout the economy. (See Appendix Tables K-1 and K-2 for impacts on major industry sectors and specific manufacturing industries.)

Technology Transfer

The Laboratory invites industry to develop and market the inventions it has patented. As of January 15, 2005 there were 162 inventions in BSA's portfolio, of which 96 were licensed and 63 were commercialized. Those commercialized inventions are in the fields of molecular biology, pharmaceuticals, instrumentation, environmental technologies, and electronics. New York State is relying on these industries to form the core of a growing technology base.

Brookhaven Lab's cooperative research and development agreements (CRADAs) with local industry are also important vehicles for technology transfer. They allow local firms to use BNL's unique equipment and technical staff. These CRADAs are funded largely by the U.S. Department of Energy. During the fiscal 2000-2004 period, DOE funding for Brookhaven Lab's CRADA program totaled \$5.5 million. (A list of New York State-based CRADA program participants over the past decade and the total funding for each appears in Appendix L.)

BSA's Patent Portfolio			
Technology Field	Inventions in Portfolio	Inventions Licensed	Inventions Commercialized
Optics	39	39	39
Molecular Biology	24	12	6
Pharmaceuticals	26	16	3
Instrumentation	13	8	4
Materials	14	4	0
Environmental Technologies	20	13	7
Medical Devices	10	0	0
Catalysts	10	0	0
Electronics	4	4	4
Nanofabrication	2	0	0
Total	162	96	63

Source: Brookhaven National Laboratory



BNL's FUTURE ECONOMIC IMPACT: FISCAL YEARS 2005-2014

BNL's Future Economic Impact, Fiscal Years 2005-2014

Future discoveries by Brookhaven Lab scientists are likely to give New York State unique competitive advantages in developing a technology-intensive industry base. Future expenditures by BNL will also have a substantial positive impact on the state's economy. BNL projects that Laboratory spending for the fiscal 2005 through 2014 period could total almost \$5.6 billion. This includes more than \$4.7 billion in operating and equipment expenditures and approximately \$864 million in construction spending.

The more than \$4.7 billion in operating and equipment expenditures will cause total New York State output to increase by more than \$9.2 billion, a net increase of almost \$4.5 billion. Statewide earnings would increase by almost \$3.3 billion, and *almost 80,000 jobs* would be created throughout the economy. Construction spending totaling \$864 million would cause an output increase of more than \$1.6 billion, earnings would rise by almost \$437 million, and *more than 11,000 jobs* would be created. (See Appendices M-O for the impacts on major industrial sectors and specific manufacturing industries.)

- Future spending of almost \$5.6 billion could cause a gross output increase of approximately, \$10.83 billion, a net output increase of \$5.23 billion, and an earnings increase of \$3.71 billion.
- *More than 91,000 jobs would be created* statewide, and virtually all industries, including some of the state's key manufacturing industries, will benefit from this spending.
- *Given this potential impact, BNL's continued viability as a premier research facility is critical to New York State's future economic growth.*

More than 91,000 jobs would be created statewide, and virtually all industries, including some of the state's key manufacturing industries, will benefit from this spending.

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Projected Operating and Construction Expenditures, BNL, Fiscal 2005-2014 (\$'000)			
Year	Operating/ Equipment Spending	Construction Spending	Total Spending
2005	\$447,200	\$25,600	\$472,800
2006	465,300	51,500	516,800
2007	480,500	33,900	514,400
2008	491,800	79,000	570,800
2009	483,500	150,700	634,200
2010	459,200	139,200	598,400
2011	459,200	100,600	559,800
2012	459,200	62,500	521,700
2013	493,200	78,000	571,200
2014	493,200	143,100	636,300
Total	4,732,300	864,100	5,596,400

Data for FY 2007 through FY 2014 is in constant 2006 dollars.
Source: Brookhaven National Laboratory

Appendix A

New York State-Based Institutional Users of BNL's National Synchrotron Light Source (NSLS), Fiscal 2003-2004	
Fiscal 2003	Fiscal 2004
Albert Einstein Medical College	Albert Einstein Medical College
American Physical Society	Bellport Senior High School
Brentwood High School	Brentwood High School
Brooklyn College	Brookhaven National Laboratory
City University of New York	Brooklyn College
Cold Spring Harbor Laboratory	City University of New York
Columbia University	Cold Spring Harbor Laboratory
Cornell University	Columbia University
Hauptman-Woodward Medical Research Institute	Cornell University
Howard Hughes Medical Institute	Corning, Inc.
Hunter College	General Electric Corporate Research & Development
IBM Research Division	Half Hollow Hills High School East
Mount Sinai Medical Center	Hauppauge High School
Mount Sinai School of Medicine	Hauptman-Woodward Medical Research Institute
Nanoprobes	Hunter College
New York State Health Dept.	IBM Research Division
NY Structural Biology Center	Memorial Sloan-Kettering Cancer Center
New York University	Mount Saint Mary College
Noszko Machine Co., Inc.	Mount Sinai School of Medicine
Oceanside High School	Nanoprobes
Pfizer, Inc.	NYS Department of Health
Philips Research USA	NY Structural Biology Center
Polytechnic University	New York University
Rensselaer Polytechnic Institute	Noszko Machine Co., Inc.
Rockefeller University	Oceanside High School
Sarah Lawrence College	Pfizer, Inc.
Sci-Med	Philips Research USA
Shoreham-Wading River High School	Polytechnic University
Sloan-Kettering Institute for Cancer Research	Rensselaer Polytechnic Inst.
Smithtown High School	Rockefeller University
Suffolk Community College	SUNY - Buffalo
SUNY - Buffalo	SUNY - Plattsburgh
SUNY - Oneonta	SUNY - Stony Brook
SUNY - Plattsburgh	Sagurton Scientific Services
SUNY - Stony Brook University	Sarah Lawrence College
Syracuse University	Shoreham-Wading River High School
Valley Stream North High School	Sloan-Kettering Institute for Cancer Research
Ward Melville High school	Smithtown High School
Wyeth-Ayerst Research	Syracuse University
Yeshiva University	Wadsworth Center
	Yeshiva University

Source: Brookhaven National Laboratory

Appendix B

New York State-Based Institutional Users of BNL's Relativistic Heavy Ion Collider (RHIC), Fiscal 2004	
User	Type of User
City University of New York	University
Columbia University	University
Columbia University, Nevis Laboratories	Laboratory
Data Device Corporation	Company
Modular Devices, Inc.	Company
New York University	University
RIKEN Brookhaven Research	Government
Seaford High School	High School
Sensitron Semiconductor	Company
SRI International	Company
St. John's University	University
SUNY - Stony Brook University	University
Stony Brook University Hospital	Hospital
Syracuse University	University
Tektronix	Company
University of Rochester	University

Appendix C

Number of Students Participating in BNL's Educational Programs, Fiscal 1995-2004, by Program Category	
Program Category	Number of Students
BNL Science & Society Essay Contest	277
Bridge Building Contest (JHS/HS)	3,180
Community Summer Science (11 th & 12 th)	326
Discoveries-to-go (K-3)	6,090
Discovery Tours (1-3)	65,157
FIRST Robotics Contest (HS)	105
Intro to Computers	343
Long Island/NYS Mentoring Partnership	131
MAGLEV Contest (Middle School)	2,753
Magnets-to-go (4-5)	71,218
Minority High School Apprenticeship (9 th & 10 th)	297
Museum Inquiries in Science (6-8)	4,248
Museum Tours - Investigation in Science (4-6)	47,378
School Tour Program - School Groups (7-12)	2,930
College Tour Program	17,729
Science Bowl	607
Science Fair	6,497
Summer Science Explorations (4-6)	986
Women in Science Career Days	443
Summer/Semester Undergraduate Programs	984
Community College Summer Program	142
Mini Semester	170
Northeast Consortium/NIH Program	216
Saturday Science Explorations	1,027
Scientist in Residents	600
NASA Summer School	11
All Others	1,694
Total	235,539

Note: Applicable grade levels shown in parenthesis. Source: Brookhaven National Laboratory

Appendix D

Table D-1: Secondary Economic Impact of BNL Operating Expenditures of \$3.7 Billion, Fiscal 1993-2003

Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$26,256,960	\$8,752,320	442
Construction	79,135,560	23,704,200	589
Manufacturing	282,627,000	63,089,640	1,379
Transportation	122,532,480	42,302,880	1,208
Communications	116,697,600	22,245,480	268
Utilities	77,676,840	13,128,480	143
Wholesale Trade	180,151,920	49,961,160	954
Retail Trade	274,239,360	89,711,280	4,086
Finance	266,216,400	67,465,800	879
Insurance	118,885,680	34,644,600	608
Real Estate	533,891,520	23,339,520	764
Hotels & Tourist Accommodations	64,183,680	18,963,360	905
Personal Services	40,114,800	15,681,240	886
Business Services	4,318,540,560	1,841,269,320	40,956
Eating & Drinking Places	106,851,240	32,456,520	2,051
Health Services	301,225,680	122,532,480	2,998
Miscellaneous Services	181,245,960	53,243,280	2,209
Households	--	3,646,800	291
Total	7,090,473,240	2,526,138,360	61,616

Table D-2: Secondary Economic Impact of BNL Operating Expenditures of \$3.7 Billion on Manufacturing, Fiscal 1993-2003

Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$27,715,680	\$4,011,480	115
Textiles & Apparel	13,857,840	2,188,080	75
Paper	26,256,960	4,011,480	98
Printing & Publishing	74,759,400	21,516,120	431
Chemicals	41,208,840	7,293,600	82
Rubber & Plastics	12,763,800	2,552,760	69
Lumber	5,105,520	1,094,040	39
Stone, Clay & Glass	5,105,520	1,094,040	19
Primary & Fabricated Metals	8,752,320	2,188,080	62
Industrial Machinery	20,422,080	6,564,240	150
Electronics & Electrical Machinery	22,974,840	5,105,520	104
Transportation Equipment	3,282,120	729,360	13
Instruments	10,940,400	2,188,080	44
Miscellaneous Manufacturing	9,481,680	2,552,760	78
Total	282,627,000	63,089,640	1,379

Appendix E

Table E-1: Secondary Economic Impact of BNL User Expenditures of \$100 Million, Fiscal 1993-2003

Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$720,000	\$240,000	12
Construction	2,170,000	650,000	16
Manufacturing	7,750,000	1,730,000	38
Transportation	3,360,000	1,160,000	33
Communications	3,200,000	610,000	7
Utilities	2,130,000	360,000	4
Wholesale Trade	4,940,000	1,370,000	26
Retail Trade	7,520,000	2,460,000	112
Finance	7,300,000	1,850,000	24
Insurance	3,260,000	950,000	17
Real Estate	14,640,000	640,000	21
Hotels & Tourist Accommodations	1,760,000	520,000	25
Personal Services	1,100,000	430,000	24
Business Services	118,420,000	50,490,000	1,123
Eating & Drinking Places	2,930,000	890,000	56
Health Services	8,260,000	3,360,000	82
Miscellaneous Services	4,970,000	1,460,000	61
Households	--	100,000	8
Total	194,430,000	69,270,000	1,689

Table E-2: Secondary Economic Impact of BNL User Expenditures of \$100 Million on Manufacturing, Fiscal 1993-2003

Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$760,000	\$110,000	3
Textiles & Apparel	380,000	60,000	2
Paper	720,000	110,000	3
Printing & Publishing	2,050,000	590,000	12
Chemicals	1,130,000	200,000	2
Rubber & Plastics	350,000	70,000	2
Lumber	140,000	30,000	1
Stone, Clay & Glass	140,000	30,000	1
Primary & Fabricated Metals	240,000	60,000	2
Industrial Machinery	560,000	180,000	4
Electronics & Electrical Machinery	630,000	140,000	3
Transportation Equipment	90,000	20,000	0
Instruments	300,000	60,000	1
Miscellaneous Manufacturing	260,000	70,000	2
Total	7,750,000	1,730,000	38

Source: Consultant's computations based on RIMS II multipliers

Appendix F

Table F-1: Secondary Economic Impact of BNL Equipment Purchases of \$292.6 Million, Fiscal 1993-2003

Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$1,784,860	\$731,500	37
Construction	7,870,940	2,340,800	59
Manufacturing	25,543,980	5,764,220	129
Transportation	8,719,480	2,984,520	86
Communications	9,158,380	1,755,600	21
Utilities	8,836,520	1,492,260	16
Wholesale Trade	11,908,820	3,306,380	63
Retail Trade	311,033,800	101,561,460	4,634
Finance	21,301,280	5,296,060	71
Insurance	8,485,400	2,487,100	44
Real Estate	48,161,960	2,633,400	85
Hotels & Tourist Accommodations	4,652,340	1,404,480	62
Personal Services	3,364,900	1,375,220	78
Business Services	34,234,200	12,435,500	293
Eating & Drinking Places	6,905,360	2,106,720	132
Health Services	18,960,480	7,724,640	189
Miscellaneous Services	12,435,500	3,540,460	144
Households	--	234,080	18
Total	543,358,200	159,174,400	6,161

Table F-2: Secondary Economic Impact of BNL Equipment Purchases of \$292.6 Million on Manufacturing, Fiscal 1993-2003

Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$2,194,500	\$321,860	9
Textiles & Apparel	936,320	175,560	5
Paper	3,306,380	497,420	13
Printing & Publishing	9,743,580	2,779,700	56
Chemicals	2,691,920	468,160	5
Rubber & Plastics	1,463,000	292,600	8
Lumber	380,380	87,780	3
Stone, Clay & Glass	175,560	29,260	1
Primary & Fabricated Metals	848,540	204,820	6
Industrial Machinery	702,240	204,820	4
Electronics & Electrical Machinery	1,111,880	234,080	5
Transportation Equipment	497,420	87,780	2
Instruments	614,460	117,040	3
Miscellaneous Manufacturing	877,800	263,340	9
Total	25,543,980	5,764,220	129

Appendix G

Table G-1: Secondary Economic Impact of BNL Construction Expenditures of \$721.6 Million, Fiscal 1993-2003

Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$6,205,760	\$2,742,080	135
Construction	730,475,680	190,791,040	4,526
Manufacturing	108,528,640	25,183,840	618
Transportation	21,070,720	6,710,880	201
Communications	15,081,440	2,886,400	34
Utilities	10,607,520	1,804,000	20
Wholesale Trade	50,656,320	14,071,200	268
Retail Trade	64,222,400	20,998,560	956
Finance	39,688,000	9,958,080	131
Insurance	24,390,080	7,143,840	125
Real Estate	69,706,560	2,886,400	93
Hotels & Tourist Accommodations	8,875,680	2,597,760	126
Personal Services	5,989,280	2,381,280	132
Business Services	118,486,720	43,728,960	1,000
Eating & Drinking Places	14,576,320	4,401,760	280
Health Services	43,584,640	17,679,200	434
Miscellaneous Services	28,142,400	8,298,400	345
Households	--	577,280	45
Total	1,360,288,160	364,840,960	9,469

Table G-2: Secondary Economic Impact of BNL Construction Spending of \$721.6 Million on Manufacturing, Fiscal 1993-2003

Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$3,896,640	\$577,280	17
Textiles & Apparel	2,309,120	360,800	13
Paper	5,123,360	793,760	20
Printing & Publishing	8,514,880	2,381,280	48
Chemicals	7,721,120	1,298,880	17
Rubber & Plastics	9,380,800	1,804,000	51
Lumber	2,958,560	577,280	19
Stone, Clay & Glass	14,864,960	4,040,960	97
Primary & Fabricated Metals	31,028,800	7,793,280	208
Industrial Machinery	6,638,720	1,659,680	39
Electronics & Electrical Machinery	12,411,520	2,958,560	67
Transportation Equipment	577,280	144,320	2
Instruments	1,804,000	432,960	9
Miscellaneous Manufacturing	1,298,880	360,800	11
Total	108,528,640	25,183,840	618

Source: Consultant's computations based on RIMS II multipliers

Appendix H

Table H-1: Secondary Economic Impact of BNL Operating Expenditures of \$402.2 Million, Fiscal 2004

Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$2,895,840	\$965,280	49
Construction	8,727,740	2,614,300	65
Manufacturing	31,170,500	6,958,060	152
Transportation	13,513,920	4,665,520	133
Communications	12,870,400	2,453,420	30
Utilities	8,566,860	1,447,920	16
Wholesale Trade	19,868,680	5,510,140	105
Retail Trade	30,245,440	9,894,120	451
Finance	29,360,600	7,440,700	97
Insurance	13,111,720	3,820,900	67
Real Estate	58,882,080	2,574,080	84
Hotels & Tourist Accommodations	7,078,720	2,091,440	100
Personal Services	4,424,200	1,729,460	98
Business Services	476,285,240	203,070,780	4,517
Eating & Drinking Places	11,784,460	3,579,580	226
Health Services	33,221,720	13,513,920	331
Miscellaneous Services	19,989,340	5,872,120	244
Households	-	402,200	30
Total	781,997,460	278,603,940	6,795

Table H-2: Secondary Economic Impact of BNL Operating Expenditures of \$402.2 Million on Manufacturing, Fiscal 2004

Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$3,056,720	\$442,420	13
Textiles & Apparel	1,528,360	241,320	8
Paper	2,895,840	442,420	11
Printing & Publishing	8,245,100	2,372,980	47
Chemicals	4,544,860	804,400	9
Rubber & Plastics	1,407,700	281,540	8
Lumber	563,080	120,660	4
Stone, Clay & Glass	563,080	120,660	2
Primary & Fabricated Metals	965,280	241,320	7
Industrial Machinery	2,252,320	723,960	17
Electronics & Electrical Machinery	2,533,860	563,080	11
Transportation Equipment	361,980	80,440	1
Instruments	1,206,600	241,320	5
Miscellaneous Manufacturing	1,045,720	281,540	9
Total	31,170,500	6,958,060	152

Appendix I

Table I-1: Secondary Economic Impact of BNL User Expenditures of \$11.4 Million, Fiscal 2004

Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$82,080	\$27,360	1
Construction	247,380	74,100	2
Manufacturing	883,500	197,220	4
Transportation	383,040	132,240	4
Communications	364,800	69,540	1
Utilities	242,820	41,040	0
Wholesale Trade	563,160	156,180	3
Retail Trade	857,280	280,440	13
Finance	832,200	210,900	3
Insurance	371,640	108,300	2
Real Estate	1,668,960	72,960	2
Hotels & Tourist Accommodations	200,640	59,280	3
Personal Services	125,400	49,020	3
Business Services	13,499,880	5,755,860	128
Eating & Drinking Places	334,020	101,460	6
Health Services	941,640	383,040	9
Miscellaneous Services	566,580	166,440	7
Households	-	11,400	2
Total	22,165,020	7,896,780	193

Table I-2: Secondary Economic Impact of BNL User Expenditures of \$11.4 Million on Manufacturing, Fiscal 2004

Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$86,640	\$12,540	0
Textiles & Apparel	43,320	6,840	0
Paper	82,080	12,540	0
Printing & Publishing	233,700	67,260	1
Chemicals	128,820	22,800	1
Rubber & Plastics	39,900	7,980	0
Lumber	15,960	3,420	0
Stone, Clay & Glass	15,960	3,420	0
Primary & Fabricated Metals	27,360	6,840	0
Industrial Machinery	63,840	20,520	1
Electronics & Electrical Machinery	71,820	15,960	1
Transportation Equipment	10,260	2,280	0
Instruments	34,200	6,840	0
Miscellaneous Manufacturing	29,640	7,980	0
Total	883,500	197,220	4

Source: Consultant's computations based on RIMS II multipliers

Appendix J

Table J-1: Secondary Economic Impact of BNL Equipment Purchases of \$27.1 Million, Fiscal 2004

Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$165,310	\$67,750	3
Construction	728,990	216,800	5
Manufacturing	2,365,830	533,870	12
Transportation	807,580	276,420	8
Communications	848,230	162,600	2
Utilities	818,420	138,210	2
Wholesale Trade	1,102,970	306,230	6
Retail Trade	28,807,300	9,406,410	429
Finance	1,972,880	490,510	7
Insurance	785,900	230,350	4
Real Estate	4,460,660	243,900	8
Hotels & Tourist Accommodations	430,890	130,080	6
Personal Services	311,650	127,370	7
Business Services	3,170,700	1,151,750	27
Eating & Drinking Places	639,560	195,120	12
Health Services	1,756,080	715,440	17
Miscellaneous Services	1,151,750	327,910	13
Households	-	21,680	3
Total	50,324,700	14,742,400	571

Table J-2: Secondary Economic Impact of BNL Equipment Purchases of \$27.1 Million on Manufacturing, Fiscal 2004

Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$203,250	\$29,810	1
Textiles & Apparel	86,720	16,260	0
Paper	306,230	46,070	1
Printing & Publishing	902,430	257,450	6
Chemicals	249,320	43,360	1
Rubber & Plastics	135,500	27,100	1
Lumber	35,230	8,130	0
Stone, Clay & Glass	16,260	2,710	0
Primary & Fabricated Metals	78,590	18,970	1
Industrial Machinery	65,040	18,970	0
Electronics & Electrical Machinery	102,980	21,680	0
Transportation Equipment	46,070	8,130	0
Instruments	56,910	10,840	0
Miscellaneous Manufacturing	81,300	24,390	1
Total	2,365,830	533,870	12

Appendix K

Table K-1: Secondary Economic Impact of BNL Construction Expenditures of \$13.7 Million, Fiscal 2004

Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$117,820	\$52,060	3
Construction	13,868,510	3,622,280	86
Manufacturing	2,060,480	478,130	12
Transportation	400,040	127,410	4
Communications	286,330	54,800	1
Utilities	201,390	34,250	0
Wholesale Trade	961,740	267,150	5
Retail Trade	1,219,300	398,670	18
Finance	753,500	189,060	2
Insurance	463,060	135,630	2
Real Estate	1,323,420	54,800	2
Hotels & Tourist Accommodations	168,510	49,320	2
Personal Services	113,710	45,210	3
Business Services	2,249,540	830,220	19
Eating & Drinking Places	276,740	83,570	5
Health Services	827,480	335,650	8
Miscellaneous Services	534,300	157,550	7
Households	6,925,350	10,960	1
Total	25,825,870	6,926,720	180

Table K-2: Secondary Economic Impact of BNL Construction Expenditures of \$13.7 Million on Manufacturing, Fiscal 2004

Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$73,980	\$10,960	0
Textiles & Apparel	43,840	6,850	0
Paper	97,270	15,070	0
Printing & Publishing	161,660	45,210	1
Chemicals	146,590	24,660	0
Rubber & Plastics	178,100	34,250	1
Lumber	56,170	10,960	0
Stone, Clay & Glass	282,220	76,720	2
Primary & Fabricated Metals	589,100	147,960	5
Industrial Machinery	126,040	31,510	1
Electronics & Electrical Machinery	235,640	56,170	2
Transportation Equipment	10,960	2,740	0
Instruments	34,250	8,220	0
Miscellaneous Manufacturing	24,660	6,850	0
Total	2,060,480	478,130	12

Source: Consultant's computations based on RIMS II multipliers

Appendix L

**BNL Cooperative Research and Development Agreements
with New York State-Based Program Participants Over the Past Decade**

Program Participant	Total Funding
Advanced Energy Systems, Inc.	\$614,000
Applied Genetics, Inc.	767,000
Applied Physics Technology	36,000
BioCat, Inc.	435,000
Brookhaven Technology Group, Inc.	1,480,000
Consolidated Edison Co. of New York	540,000
Consolidated Edison Company	1,389,000
Continental Optical	420,000
Curtiss Wright Flow Control Corp.	25,000
DFD Solid State	84,900
Environmental Solutions	100,000
Francis Christian Gaskin, Inc.	86,000
Glaztec Incorporated	125,000
Grumman Corporation	450,000
Heat Wise, Inc.	255,000
Ion Focus	600,000
LeCroy	526,000
Modular Devices, Inc.	60,000
Moltech Corporation	50,000
NYSERDA	548,000
NYSERNet, Inc.	300,000
Perfect Sense, Inc.	20,000
Perfect Sense/LIRI	359,000
Plasma Physics, Corp.	210,000
St. Luke's Roosevelt Hospital Center	90,000
Symbol Technologies, Inc.	1,034,000

Source: Brookhaven National Laboratory

Appendix M

**Table M-1: Secondary Economic Impact of Projected BNL
Spending of \$5.6 Billion, Fiscal 2005-2014**

Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$41,503,820	\$14,641,100	735
Construction	977,419,340	259,227,990	6,184
Manufacturing	496,713,890	112,025,880	2,529
Transportation	184,237,000	62,930,810	1,809
Communications	169,493,290	32,323,430	389
Utilities	113,500,260	19,196,530	210
Wholesale Trade	294,435,440	81,682,460	1,558
Retail Trade	432,773,860	141,559,890	6,447
Finance	392,983,400	99,472,130	1,297
Insurance	183,479,560	53,511,440	939
Real Estate	776,280,780	33,743,120	1,102
Hotels & Tourist Accommodations	93,916,910	27,718,720	1,326
Personal Services	59,227,330	23,200,420	1,309
Business Services	5,745,874,880	2,441,702,730	54,344
Eating & Drinking Places	156,111,210	47,388,480	2,997
Health Services	443,079,620	180,175,730	4,410
Miscellaneous Services	268,895,210	79,028,730	3,280
Households	--	5,423,580	429
Total	10,829,925,800	3,714,953,170	91,294

**Table M-2: Secondary Economic Impact of Projected BNL Spending
of \$5.6 Billion on Specific Manufacturing Industries, Fiscal 2005-2014**

Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$40,631,620	\$5,896,810	169
Textiles & Apparel	20,747,860	3,271,430	113
Paper	40,207,670	6,156,040	151
Printing & Publishing	107,208,530	30,772,100	616
Chemicals	62,720,860	11,019,980	127
Rubber & Plastics	27,796,350	5,472,860	151
Lumber	10,168,030	2,110,970	74
Stone, Clay & Glass	24,425,680	6,258,650	140
Primary & Fabricated Metals	48,513,820	12,171,660	329
Industrial Machinery	34,450,600	10,505,570	241
Electronics & Electrical Machinery	44,676,010	10,168,030	215
Transportation Equipment	4,950,350	1,119,280	20
Instruments	16,357,150	3,357,840	68
Miscellaneous Manufacturing	13,859,360	3,744,660	115
Total	496,713,890	112,025,880	2,529

Source: Consultant's computations based on RIMS II multipliers

Appendix N

Table N-1: Secondary Economic Impact of Projected BNL Operating/ Equipment Expenditures of \$4.7 Billion, Fiscal 2005-2014

Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$34,072,560	\$11,357,520	573
Construction	102,690,910	30,759,950	764
Manufacturing	366,753,250	81,868,790	1,789
Transportation	159,005,280	54,894,680	1,568
Communications	151,433,600	28,867,030	348
Utilities	100,797,990	17,036,280	186
Wholesale Trade	233,775,620	64,832,510	1,237
Retail Trade	355,868,960	116,414,580	5,302
Finance	345,457,900	87,547,550	1,140
Insurance	154,272,980	44,956,850	789
Real Estate	692,808,720	30,286,720	991
Hotels & Tourist Accommodations	83,288,480	24,607,960	1,175
Personal Services	52,055,300	20,348,890	1,150
Business Services	5,603,989,660	2,389,338,270	53,147
Eating & Drinking Places	138,656,390	42,117,470	2,662
Health Services	390,887,980	159,005,280	3,890
Miscellaneous Services	235,195,310	69,091,580	2,866
Households	--	4,732,300	378
Total	9,201,010,890	3,278,064,210	79,955

Table N-2: Secondary Economic Impact of BNL Operating/Equipment Spending of \$4.7 Billion on Specific Manufacturing Industries, Fiscal 2005-2014

Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$35,965,480	\$5,205,530	149
Textiles & Apparel	17,982,740	2,839,380	98
Paper	34,072,560	5,205,530	127
Printing & Publishing	97,012,150	27,920,570	559
Chemicals	53,474,990	9,464,600	107
Rubber & Plastics	16,563,050	3,312,610	90
Lumber	6,625,220	1,419,690	51
Stone, Clay & Glass	6,625,220	1,419,690	24
Primary & Fabricated Metals	11,357,520	2,839,380	80
Industrial Machinery	26,500,880	8,518,140	194
Electronics & Electrical Machinery	29,813,490	6,625,220	135
Transportation Equipment	4,259,070	946,460	17
Instruments	14,196,900	2,839,380	57
Miscellaneous Manufacturing	12,303,980	3,312,610	102
Total	366,753,250	81,868,790	1,789

Appendix O

Table O-1: Secondary Economic Impact of Projected BNL Construction Expenditures of \$864.1 Million, Fiscal 2005-2014

Industry Sector	Output Increase	Earnings Increase	Employment Increase
Agriculture, Forestry, Fisheries	\$7,431,260	\$3,283,580	162
Construction	874,728,430	228,468,040	5,420
Manufacturing	129,960,640	30,157,090	740
Transportation	25,231,720	8,036,130	241
Communications	18,059,690	3,456,400	41
Utilities	12,702,270	2,160,250	24
Wholesale Trade	60,659,820	16,849,950	321
Retail Trade	76,904,900	25,145,310	1,145
Finance	47,525,500	11,924,580	157
Insurance	29,206,580	8,554,590	150
Real Estate	83,472,060	3,456,400	111
Hotels & Tourist Accommodations	10,628,430	3,110,760	151
Personal Services	7,172,030	2,851,530	159
Business Services	141,885,220	52,364,460	1,197
Eating & Drinking Places	17,454,820	5,271,010	335
Health Services	52,191,640	21,170,450	520
Miscellaneous Services	33,699,900	9,937,150	414
Households	--	691,280	51
Total	1,628,914,910	436,888,960	11,339

Table O-2: Secondary Economic Impact of BNL Construction Spending of \$864.1 Million on Specific Manufacturing Industries, Fiscal 2005-2014

Manufacturing Industry	Output Increase	Earnings Increase	Employment Increase
Food	\$4,666,140	\$691,280	20
Textiles & Apparel	2,765,120	432,050	15
Paper	6,135,110	950,510	24
Printing & Publishing	10,196,380	2,851,530	57
Chemicals	9,245,870	1,555,380	20
Rubber & Plastics	11,233,300	2,160,250	61
Lumber	3,542,810	691,280	23
Stone, Clay & Glass	17,800,460	4,838,960	116
Primary & Fabricated Metals	37,156,300	9,332,280	249
Industrial Machinery	7,949,720	1,987,430	47
Electronics & Electrical Machinery	14,862,520	3,542,810	80
Transportation Equipment	691,280	172,820	3
Instruments	2,160,250	518,460	11
Miscellaneous Manufacturing	1,555,380	432,050	14
Total	129,960,640	30,157,090	740

Source: Consultant's computations based on RIMS II multipliers

