

**Economic Impact of the
Thomas Jefferson National Accelerator Facility
Fiscal Year 2007**



**Newport News, Virginia
Revised February 2008**

Prepared for
The Southeastern Universities Research Association

Prepared by
The Wessex Group, Ltd.
479 McLaws Circle, Suite 1
Williamsburg, Virginia 23185
Telephone: 757.253.5606
Fax: 757.253.2565
E-mail: wessexgroup@wessexgroup.com
Website: www.wessexgroup.com

Economic Impact of the Thomas Jefferson National Accelerator Facility Fiscal Year 2007

EXECUTIVE SUMMARY

Every year, countless numbers of motorists traveling Interstate 64 pass by huge signs announcing the exits for **The Thomas Jefferson National Accelerator Facility** (Jefferson Lab, JLAB or the lab) in Newport News, Virginia. But, while the signs tell people how to find Jefferson Lab, they do not describe the impact this facility has, and will have in the future, on the local, state and national economies. With a history that traces from the 1970's, Jefferson Lab today is a world-class nuclear physics research center operated by the Department of Energy (DOE). Today it provides scientists from around the globe with the world's largest superconducting radio frequency-powered electron accelerator (conceptually a super-powerful microscope that allows scientists to peer into the nucleus of an atom and to better understand matter). However, it is not only an extraordinary scientific facility, it also is a significant contributor to the local economy and over the next eight (8) years JLAB will dramatically expand the capabilities of its Continuous Electron Beam Accelerator Facility (CEBAF) from its current 6 GeV beam operation to a 12GeV beam together with the collateral doubling of the capacity of its 2K refrigeration Cryogenic Helium plant. The expansion itself will, over the next eight years, add significantly to the region's and nation's economy. However, the more significant contribution of the expansion will be to position Jefferson Lab for a leading and continuing role in the nation's basic research of the atom's nucleus at the quark level. And, with this expanded facility it will continue to provide enormous collateral economic benefits for region, state and nation for many, many years into the future.

In an effort to fill this information void and to delineate the economic benefits of the facility now and when expanded, Southeastern Universities Research Association (SURA) commissioned *The Wessex Group, Ltd.* to prepare an assessment of the Fiscal Year (FY) 2007 economic impact of the facility, its \$100 million annual budget and the almost 1,200 employees and contractors who work there. SURA sought an assessment of the direct economic impact of the facility on Hampton Roads, on the Commonwealth of Virginia, and on the nation. It also sought an objective economic estimate of the expected impact of the proposed \$317.5 million expansion of the Lab's capabilities. This report presents the results of that assessment.

Economic Impact of the Thomas Jefferson National Accelerator Facility

Jefferson Lab, as it is configured today, generates following economic benefits:

- For the **nation**, Jefferson Lab creates **\$317.7 million** in income and **2,686 jobs**. The income and jobs represent the potential loss of income and jobs that would be felt by the country if the lab suddenly were shut down.
- For the **Commonwealth of Virginia**, Jefferson Lab generates **\$150.6 million** in income and **1,701 jobs**.
- For the **Hampton Roads** area it creates economic benefits in the amount of **\$131.9 million** in income for the area and a total of **1,607 jobs**.

The economic benefits to the region, state and nation created by the presence of Jefferson Lab primarily derive from three sources...

- the direct spending by the lab, by its contractors, by the user community and by the visitors to the lab

- the unparalleled intellectual benefits derived from the access by regional and national research colleges, institutions and schools to the resources and discoveries made available by Jefferson Lab, and
- the commercialization of its research findings.

This report provides estimates of the economic impact of the lab, its equipment, facilities, people, contractors and users. It does not attempt to define, in monetary terms, the considerable intellectual and commercial impact for the nation that it also creates.

For example, in FY07 it is estimated that the equivalent of over 150 full-time research and professionals traveled to Newport News from around the nation and world to learn about and make use of the lab's unique facilities. About 2/3rd of these professionals originate from U.S. research institutions and 1/3 from other countries. They all come here to work on the world-class facilities at Jefferson Laboratory and to pursue their research. If valued at the current average salary for a JLab scientist, their combined annual payroll is equivalent to \$24.5 M, a portion of which is spent in the local community.

With on-site employment (direct and contractors) of 952 full-time-equivalent workers in FY 2007, Jefferson Lab is one of the top 30 employers on the Peninsula (not including local government).

- The facility's overall average weekly wage of \$1,270 is 176% of the \$719 average weekly wage paid on the Peninsula (VEC, 2006). The higher wages paid by Jefferson Lab and its contractors are the result of its employment of numerous highly skilled scientists and professionals. The 158 scientific and engineering professionals (lab employees and contractors combined) are paid by DOE an average of \$1,496 per week and their jobs represent nearly one out of ten of the Hampton Roads professionals employed in Professional and Technical Services (VEC).

The nation also benefits from the considerable support provided by Jefferson Lab to the higher education institutions in the state and nation.

- More than one-third of the Ph.D.s in nuclear physics awarded in the U.S. are based on Jefferson Lab research, creating an enormous immediate and long-term impact on U.S. technology and the national economy.

Economic Impact of the 12GeV Expansion of the Thomas Jefferson National Accelerator Facility

Over the course of the next eight (8) years through 2015 a \$ **317.5 investment in expanding Jefferson Lab's capabilities** will create an ***additional*** economic impact for ...

- **The United States** of \$ **\$624.7 million** in income and **4,094 new jobs** that will be paid a cumulative total of **\$191.1 million**.
- **The Commonwealth of Virginia** cumulative total of **\$273.2 million** and **1,950 jobs**.
- **Hampton Roads** **\$178.5 million** in additional income and **1,290 jobs**.

In addition to these direct economic benefits that will flow from the upgrading of the Lab's capabilities, the 12GeV beam upgrading of the accelerator will insure that the Thomas Jefferson National Accelerator Facility, a major economic engine for the region, state and nation, will continue its leadership role in the exploration of the physics of the basic building blocks of matter, the atom, and the advancement of the nation's scientific knowledge.

**Economic Impact of the Thomas Jefferson National Accelerator Facility
Fiscal Year 2007**

TABLE OF CONTENTS

EXECUTIVE SUMMARY i

INTRODUCTION..... 4

ECONOMIC IMPACT IN THE UNITED STATES..... 5

ECONOMIC IMPACT IN VIRGINIA 7

ECONOMIC IMPACT IN HAMPTON ROADS 9

ECONOMIC IMPACT OF FACILITY EXPANSION..... 11

APPENDIX..... 15

Economic Impact of the Thomas Jefferson National Accelerator Facility Fiscal Year 2007

Section 1

INTRODUCTION

The purpose of this report is to provide a comprehensive analysis of the Economic Impact created by the Thomas Jefferson National Accelerator Facility (Jefferson Lab) on the economies of the United States, the Commonwealth of Virginia and the Hampton Roads Metropolitan Statistical Area (HR-MSA) for fiscal year 2007 (FY 2007)¹. The analysis presented here was developed through the use of the IMPLAN Economic Impact Model to estimate the indirect and induced economic output of a primary economic entity such as Jefferson Lab. IMPLAN is widely accepted both by professionals and academics as a reliable and accurate method for economic impact analysis.

As will be shown, Jefferson Lab creates enormous economic benefits for its neighbors throughout the region, state, and nation. The economic benefits flow from three primary sources that together create the majority of its direct expenditures. The first source of economic output is from the procurements and expenditures made in support of Jefferson Lab programs, including payroll, operating expenditures, and construction outlays. The second major source of economic output derives from the contractors hired and paid by Jefferson Lab, to assist it in the fulfillment of its mission. Third, because of its unique research facilities, Jefferson Lab also brings many visitors and professionals from around the nation and world to Newport News. While in Newport News, these contractors and other visitors also spend money in the immediate area for accommodations, food and transportation.

The estimation of economic impact is an analytic process that takes the direct spending by a primary entity such as Jefferson Lab and derives estimates of the indirect and induced effects from the direct expenditures. Combined, the direct, indirect and induced amounts represent the total economic impact of an economic entity. The process starts as money is spent, for example, by employees of a manufacturing firm at a local restaurant. This money is used to purchase food supplies for the restaurant or to pay restaurant employees. These payments become “indirect” economic impacts. The individuals who receive the payments spend their money at other establishments, such as grocery stores and for rent or mortgage payments. These establishments, in turn, hire and pay employees who respend the money, all of which is estimated as an “induced” effect. During each subsequent round of expenditure, some of the money “leaks” out of the original geographic area into surrounding areas, reducing the local impact of the next round of spending and further diminishing the next round of spending. The economic effect of an initial expenditure creating indirect and induced expenditures cumulatively is known as the “multiplier effect.” Taken together, the direct, indirect and induced expenditures sum to the total economic impact or economic output. The original spending is “multiplied” by the monetary recycling action of our economy.

Sections 2 – 4 discuss income and job creation by the current JLAB facility in FY 2007 for the United States, the Commonwealth of Virginia, and Hampton Roads. Tables are included showing direct, indirect and induced impact by expenditure categories. The economic impact of payroll expenditures, separated from other purchases of goods and services, is shown for each geographic area in the Appendix at the end of the report. Section 5 describes the additional annual average economic impact of the 12GeV facility expansion planned to occur over the period 2007 – 2015.

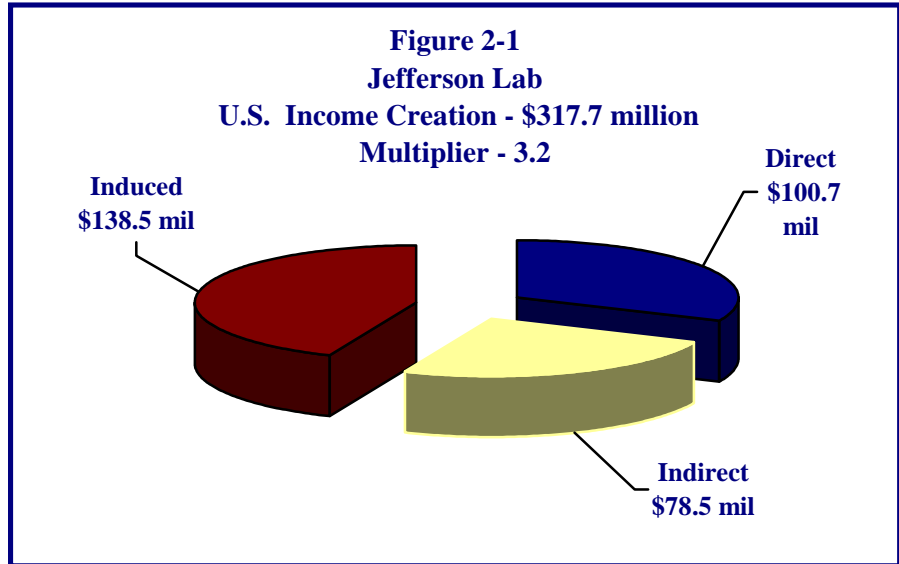
¹ October 1, 2006, to September 30, 2007

Economic Impact of the Thomas Jefferson National Accelerator Facility Fiscal Year 2007

Section 2

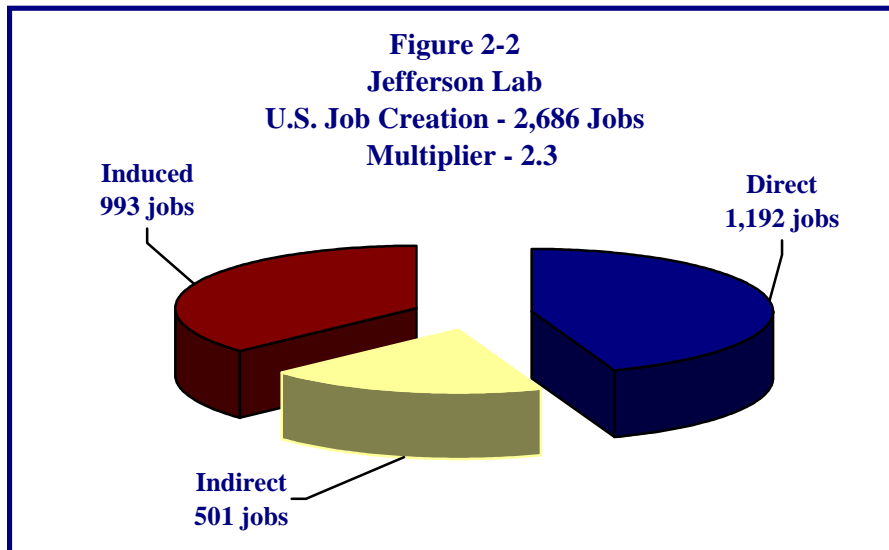
ECONOMIC IMPACT FOR THE UNITED STATES OF AMERICA

In **FY 2007**, Jefferson Lab created income of **\$317.7 million** for the nation and generated full-time-equivalent (FTE) jobs for **2,686** Americans. These results are shown in Figure 2-1 and 2-2. The effect of the direct expenditures is multiplied as the funds subsequently circulate throughout the Hampton Roads MSA, Virginia, the nation and eventually the world. “Direct” expenditures by Jefferson Lab in FY 2007 are **\$100.7 million**. “Indirect” economic output (the immediate expenditures created by the spending of Jefferson Lab employees and contractors) adds another **\$78.5 million** and the induced output (spending by the succession of persons and businesses that receive and then spend the indirect expenditures) adds another **\$138.5 million**. Combined, the spending by direct, indirect and induced sources also creates jobs for the nation.



“Direct” expenditures by Jefferson Lab in FY 2007 are **\$100.7 million**. “Indirect” economic output (the immediate expenditures created by the spending of Jefferson Lab employees and contractors) adds another **\$78.5 million** and the induced output (spending by the succession

of persons and businesses that receive and then spend the indirect expenditures) adds another **\$138.5 million**. Combined, the spending by direct, indirect and induced sources also creates jobs for the nation.



Jefferson Lab, as previously indicated, created **2,686 FTE jobs** for Americans (Figure 2-2). Of these jobs, **1,192** are directly funded by Jefferson Lab either for their employees or for contractors hired to assist the lab. Another **501 FTE jobs** are created indirectly through the spending by workers from Jefferson Lab. The spending by those workers induces **933 more FTE jobs**.

Tables 2-1 and 2-2 show a breakout of the U.S. income and job creation by type of expenditure.

Table 2-1
U.S. Income Creation – Jefferson Lab
By Expenditure Category
(\$Millions)

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Construction, Maintenance & Repair	\$ 2.9	\$ 2.7	\$ 3.5	\$ 9.1	3.2
Manufactured Goods	13.7	16.4	14.7	44.8	3.3
Information, Education & Training, Transportation & Visitors	8.3	5.6	8.6	22.6	2.7
Utilities & Facilities Services	6.4	2.8	4.8	14.0	2.2
Regular & Temp Personnel, Consultants & Professional Services	69.4	51.0	106.9	227.3	3.3
Total	\$ 100.7	\$ 78.5	\$ 138.5	\$ 317.7	3.2

Table 2-2
U.S. Job Creation – Jefferson Lab
By Expenditure Category
(FTE Jobs)

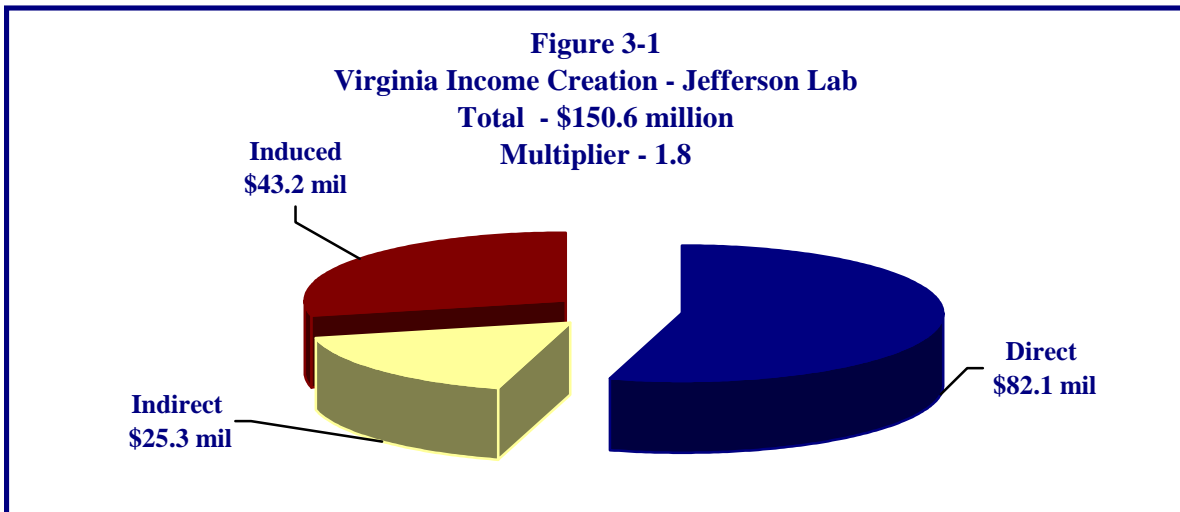
Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Construction, Maintenance & Repair	23	16	25	64	2.8
Manufactured Goods	40	80	105	226	5.6
Information, Education & Training, Transportation & Visitors	75	37	62	173	2.3
Utilities & Facilities Services	36	16	34	86	2.4
Regular & Temp Personnel, Consultants & Professional Services	1,018	352	766	2,137	2.1
Total	1,192	501	993	2,686	2.3

Economic Impact of the Thomas Jefferson National Accelerator Facility Fiscal Year 2007

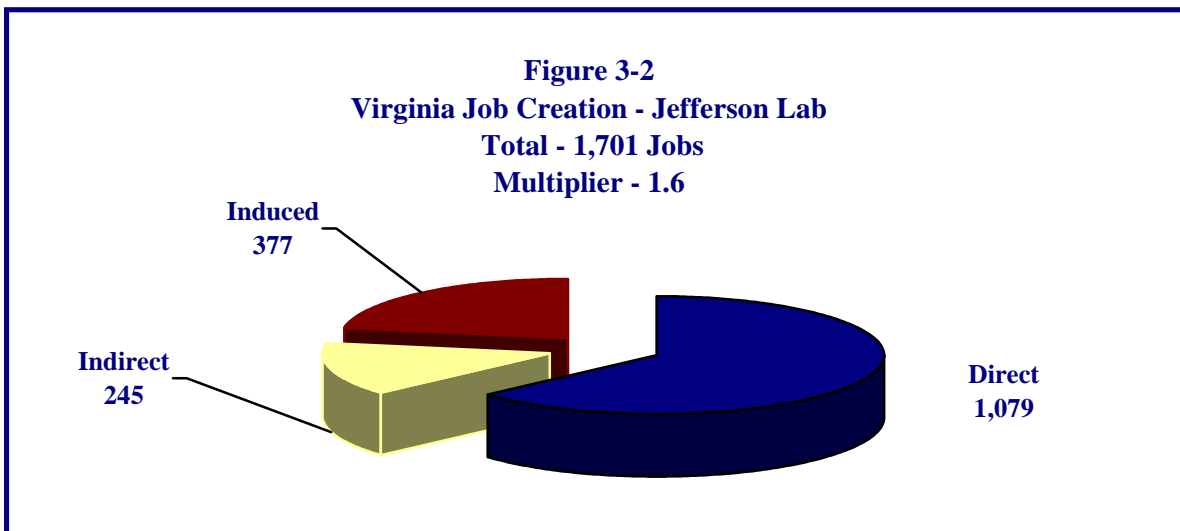
Section 3

ECONOMIC IMPACT FOR THE COMMONWEALTH OF VIRGINIA

For the Commonwealth of Virginia, Jefferson Lab created income of **\$150.6 million** (Figure 3-1) along with **1,701 FTE jobs** (Figure 3-2).



Direct expenditures by Jefferson Lab in Virginia in **FY 2007** total **\$82.1 million**. Spending by the initial recipient of these direct funds creates another **\$25.3 million** in indirect economic output. Subsequent spending of the indirect expenditures creates additional rounds of expenditures, the induced economic output. Combined with indirect expenditures of **\$25.3 million**, and the induced expenditures of **\$43.2 million**, the economic output created for the Commonwealth of Virginia by Jefferson Lab is **\$150.6 million**.



Tables 3-1 and 3-2 show a breakout of Commonwealth of Virginia income and job creation by type of expenditure.

Table 3-1
Commonwealth of Virginia Income Creation – Jefferson Lab
By Expenditure Category
(\$Millions)

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Construction, Maintenance & Repair	\$ 2.2	\$ 0.8	\$ 0.9	\$ 3.9	1.7
Manufactured Goods	2.0	0.9	0.6	3.5	1.7
Information, Education & Training, Transportation & Visitors	4.8	1.2	1.7	7.7	1.6
Utilities & Facilities Services	5.8	0.8	1.5	8.1	1.4
Regular & Temp Personnel, Consultants & Professional Services	67.2	21.6	38.6	127.4	1.9
Total	\$ 82.1	\$ 25.3	\$ 43.2	\$ 150.6	1.8

Table 3-2
Commonwealth of Virginia Job Creation – Jefferson Lab
By Expenditure Category
(FTE Jobs)

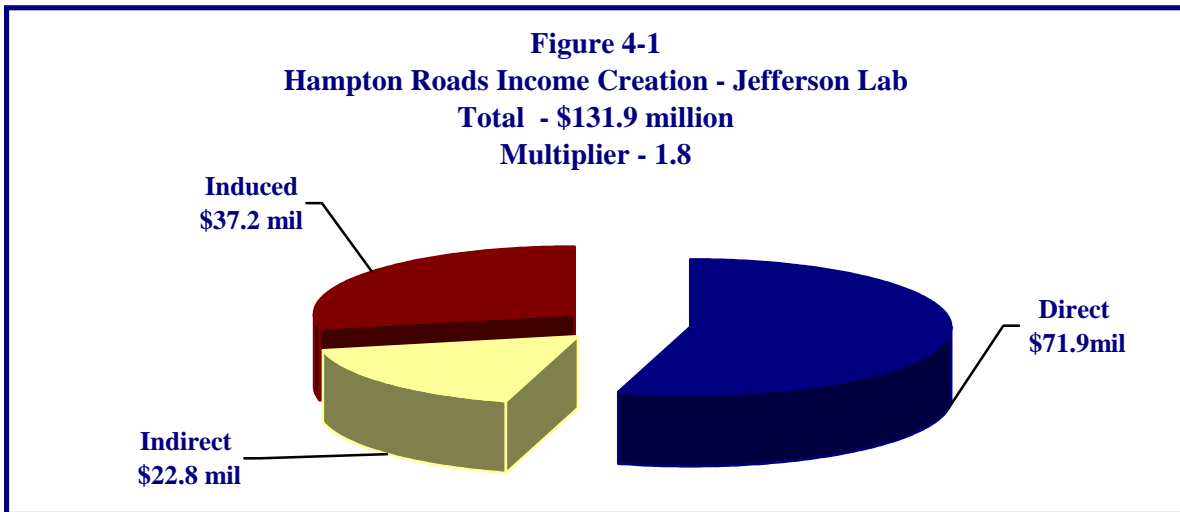
Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Construction, Maintenance & Repair	18	6	8	32	1.8
Manufactured Goods	7	5	5	17	2.3
Information, Education & Training, Transportation & Visitors	56	9	17	82	1.5
Utilities & Facilities Services	23	6	13	42	1.8
Regular & Temp Personnel, Consultants & Professional Services	974	220	335	1,529	1.6
Total	1,079	245	377	1,701	1.6

Economic Impact of The Thomas Jefferson National Accelerator Facility Fiscal Year 2007

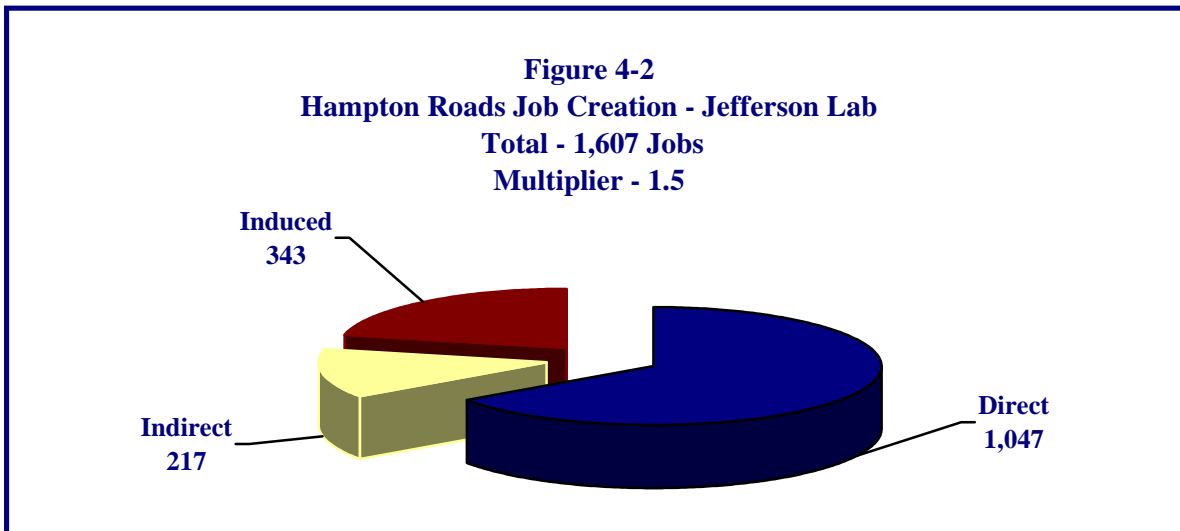
Section 4

ECONOMIC IMPACT FOR HAMPTON ROADS

Jefferson Lab generated a total economic output for **Hampton Roads of \$131.9 million** (Figure 4-1) and **1,607 FTE jobs** (Figure 4-2). Direct expenditures by Jefferson Lab for labor, operating equipment and supplies, and construction totaled **\$71.9 million in FY2007**.



Spending by the initial recipient of these direct funds creates another **\$22.8 million** in indirect economic output. Subsequent spending of the indirect expenditures creates additional rounds of expenditures, the induced economic output of **\$37.2 million**. Combined, the economic output created for Hampton Roads by Jefferson Lab is **\$131.9 million**.



Tables 4-1 and 4-2 show a breakout of the Hampton Roads income and job creation by type of expenditure.

Table 4-1
Hampton Roads Income Creation – Jefferson Lab
By Expenditure Category
(\$Millions)

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Construction, Maintenance & Repair	\$ 1.9	\$ 0.6	\$ 0.7	\$ 3.2	1.7
Manufactured Goods	1.5	0.6	0.4	2.4	1.7
Information, Education & Training, Transportation & Visitors	4.3	1.0	1.6	6.9	1.6
Utilities & Facilities Services	1.5	0.3	0.5	2.3	1.6
Regular & Temp Personnel, Consultants & Professional Services	62.8	20.2	34.0	117.0	1.9
Total	\$ 71.9	\$ 22.8	\$ 37.2	\$ 131.9	1.8

Table 4-2
Hampton Roads Job Creation – Jefferson Lab
By Expenditure Category
(FTE Jobs)

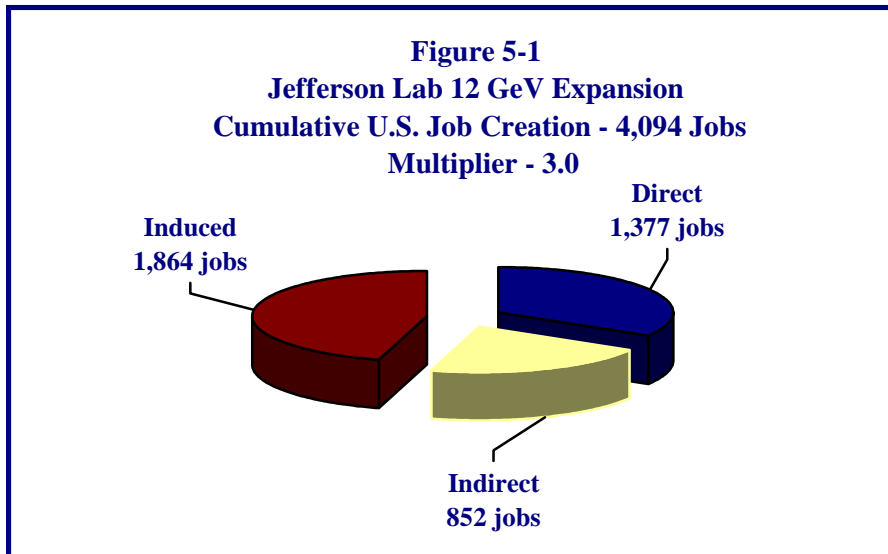
Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Construction, Maintenance & Repair	16	5	7	28	1.7
Manufactured Goods	6	4	4	13	2.3
Information, Education & Training, Transportation & Visitors	53	8	14	75	1.4
Utilities & Facilities Services	20	3	5	28	1.4
Regular & Temp Personnel, Consultants & Professional Services	952	197	315	1,463	1.5
Total	1,047	217	343	1,607	1.5

Economic Impact of The Thomas Jefferson National Accelerator Facility Fiscal Year 2007

Section 5

ECONOMIC IMPACT OF THE 12GeV FACILITY EXPANSION

Cumulatively, the additional income that will be generated for the nation over the period 2005/6 – 2015 by the doubling of the Jefferson Lab’s accelerator capabilities from its current 6GeV to a 12GeV capability will be \$624.7 million and the creation of 4,049 full-time-equivalent (FTE) jobs for Americans. These results are shown in Figure 2-1 and 2-2 following. Annually over the ten (10) year period, this represents an incremental economic stimulus of \$62.5M for the nation. The effect of the \$ 317.5 million in direct expenditures for the upgrade will be multiplied as the funds subsequently circulate throughout the Hampton Roads MSA, the Commonwealth of Virginia, the nation and eventually the world.



Cumulatively, the expansion is expected to create a total of 4,094 FTE jobs for Americans (Figure 5-1). Of these jobs, 1,377 are directly funded by the expenditures on the Lab’s upgrading. Another 852 FTE jobs will be created indirectly through the spending by these workers. The annual spending by those workers will, in turn, induce 1,864 FTE jobs.

Tables 5-1 and 5-6 show the **cumulative** and **annual** income and job creation made possible by the 12GeV expansion for the **United States**, the **Commonwealth of Virginia** and **Hampton Roads**.

Table 5-1
United States Cumulative Income and Job Creation – Jefferson Lab 12GeV Expansion
By Expenditure Category

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Purchase of Goods and Services (\$ M)	\$ 193.6	\$ 141.5	\$ 289.6	\$ 624.7	3.2
Compensation (\$M)	\$ 92.5	\$ 39.9	\$ 78.1	\$ 210.5	2.3
Employment	1,377	852	1,864	4,094	3.0

Table 5-2
United States Annual Income and Job Creation – Jefferson Lab 12GeV Expansion
By Expenditure Category

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Purchase of Goods and Services (\$M)	\$ 19.4	\$ 14.1	\$ 29.0	\$ 62.5	3.2
Compensation (\$M)	\$ 9.2	\$ 4.0	\$ 7.8	\$ 21.1	2.3
Employment	138	85	186	409	3.0

Tables 5-3 and 5-4 show cumulative and annual income and job creation by the expansion for the Commonwealth of Virginia.

Table 5-3
Commonwealth of Virginia Cumulative Income and Job Creation – Jefferson Lab 12GeV Expansion
By Expenditure Category

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Purchase of Goods and Services (\$M)	\$ 148.3	\$ 44.7	\$ 80.3	\$ 273.2	1.8
Compensation (\$M)	\$ 78.7	\$ 14.8	\$ 23.1	\$ 116.5	1.5
Employment	1,028	313	609	1,950	1.9

Table 5-4
Commonwealth of Virginia Annual Income and Job Creation – Jefferson Lab 12GeV Expansion
By Expenditure Category

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Purchase of Goods and Services (\$M)	\$ 14.8	\$ 4.4	\$ 8.0	\$ 27.3	1.8
Compensation (\$M)	\$ 7.9	\$ 1.5	\$ 2.3	\$ 11.7	1.5
Employment	103	31	61	195	1.9

Tables 5-5 and 5-6 show cumulative and annual income and job creation by the expansion for Hampton Roads.

Table 5-5
Hampton Roads Cumulative Income and Job Creation – Jefferson Lab 12GeV Expansion
By Expenditure Category
(\$Millions)

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Purchase of Goods and Services (\$M)	\$ 97.5	\$ 30.0	\$ 50.9	\$ 178.5	1.8
Compensation (\$M)	\$ 48.3	\$ 9.6	\$ 14.4	\$ 72.2	1.5
Employment	679	229	382	1,290	1.9

Table 5-6
Hampton Roads Annual Income and Job Creation – Jefferson Lab 12GeV Facility Expansion
By Expenditure Category
(\$Millions)

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Purchase of Goods and Services (\$M)	\$ 9.7	\$ 3.0	\$ 5.1	\$ 17.8	1.8
Compensation (\$M)	\$ 4.8	\$ 1.0	\$ 1.4	\$ 7.2	1.5
Employment	68	23	38	129	1.9

End Notes:

GeV - a particle physics standard unit of measurement where...

- one eV (electron Volt) is the amount of energy that an electron gains when it moves through a potential difference of 1 Volt (in a vacuum) and
- G stands for Giga, or 10^9
- Thus a GeV is a billion (in US counting) electron Volts. The mass-energy of a proton or neutron (at rest) is approximately 1 GeV.

Economic Impact of The Thomas Jefferson National Accelerator Facility

Fiscal Year 2007

APPENDIX

APPENDIX

Employment Compensation Impact – Jefferson Lab By Expenditure Category

Table A-1
U.S. Employment Compensation Impact – Jefferson Lab
By Expenditure Category
(\$Millions)

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Construction, Maintenance & Repair	\$ 0.9	\$ 0.7	\$ 0.9	\$ 2.5	2.8
Manufactured Goods	3.4	4.4	4.0	11.8	3.4
Information, Education & Training, Transportation & Visitors	2.8	1.5	2.3	6.7	2.4
Utilities & Facilities Services	1.4	0.7	1.3	3.4	2.4
Regular & Temp Personnel, Consultants & Professional Services	67.1	14.7	29.0	110.8	1.7
Total	\$ 75.7	\$ 22.0	\$ 37.5	\$ 135.2	1.8

Table A-2
Commonwealth of Virginia Employment Compensation Impact – Jefferson Lab
By Expenditure Category
(\$Millions)

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Construction, Maintenance & Repair	\$ 0.7	\$ 0.2	\$ 0.3	\$ 1.2	1.7
Manufactured Goods	0.4	0.3	0.2	0.9	2.0
Information, Education & Training, Transportation & Visitors	1.4	0.3	0.5	2.2	1.6
Utilities & Facilities Services	1.1	0.2	0.4	1.8	1.6
Regular & Temp Personnel, Consultants & Professional Services	65.8	7.0	11.1	83.9	1.3
Total	\$ 69.4	\$ 8.1	\$ 12.4	\$ 90.0	1.3

Table A-3
Hampton Roads Employment Compensation Impact – Jefferson Lab
By Expenditure Category
(\$Millions)

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Construction, Maintenance & Repair	\$ 0.6	\$ 0.2	\$ 0.2	\$ 1.0	1.7
Manufactured Goods	0.3	0.2	0.1	0.6	2.0
Information, Education & Training, Transportation & Visitors	1.3	0.3	0.4	2.0	1.5
Utilities & Facilities Services	0.5	0.1	0.2	0.7	1.5
Regular & Temp Personnel, Consultants & Professional Services	61.8	6.5	9.6	77.9	1.3
Total	\$ 64.5	\$ 7.2	\$ 10.5	\$ 82.2	1.3

Note: Amounts shown above reflect the economic impact of payroll expenditures as distinct from purchases of other goods and services. Combined, the payroll plus purchases of other goods and services create the total economic impact.