

**Economic Impact of the
Thomas Jefferson National Accelerator Facility
Fiscal Year 2010**



Newport News, Virginia

January 2011

Prepared for
Jefferson Science Associates

Prepared by
The Wessex Group, Ltd.
Williamsburg, Virginia 23185

Economic Impact of the Thomas Jefferson National Accelerator Facility Fiscal Year 2010

EXECUTIVE SUMMARY

With a history that traces from the 1970's, The Thomas Jefferson National Accelerator Facility (Jefferson Lab) is today is a world-class nuclear physics research center managed and operated by Jefferson Science Associates, LLC, A SURA / CSC Company (JSA), for the Department of Energy (DOE). Scientists from around the globe travel here to work 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). And, while a scientific gem, the laboratory also is a huge economic engine for the local community, the Commonwealth and the nation. The purpose of this report is to document those economic benefits. The documentation of Jefferson Lab's economic benefits, while impressive in scope is, nevertheless, limited by the measuring instrument used for the analysis, money. The intellectual and scientific benefits facilitated by Jefferson Lab through the research it supports, ultimately, are very likely to eclipse the immediate, measurable monetary benefits.

The Southeastern Universities Research Association (SURA) the majority member of (JSA, commissioned *The Wessex Group, Ltd.* to prepare an assessment of the Fiscal Year (FY) 2010 economic impact of the facility, its \$188.3 million annual budget and the estimated 1,270 people 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. This report presents the results of those assessments.

Economic Impact of the Thomas Jefferson National Accelerator Facility

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

- For the **nation**, Jefferson Lab generates **\$679.1million** in economic output and **4,422 jobs**. The economic output and related jobs represent the potential loss of gross output and employment that would be felt by the country if the lab suddenly were to vanish.
- For the **Commonwealth of Virginia**, Jefferson Lab generates **\$271.1 million** in economic output and **2,200 jobs**.
- For the **Hampton Roads** area it creates an economic benefit in the amount of **\$217.6 million** for the area and a total of **1,968 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 extraordinary intellectual benefits derived by regional and national research institutions, colleges, and schools who obtain access to Jefferson Laboratory's capabilities and discoveries.
- 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 potential commercial impact that the nation also derives from the operation and research that is facilitated by the existence and operation of Jefferson National Accelerator Facility.

In FY2010 Jefferson Laboratory attracted visitors and research scientists from around the world. A total of 10,530 person nights were booked in local hotels and motels by people who traveled here to work with facility and its staff.

With on-site employment (direct and contractors) of 1,041 in FY 2010, Jefferson Lab is one of the top 30 employers on the Peninsula (not including local government).

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 PhDs in nuclear physics awarded in the U.S. are based on Jefferson Lab research, creating an enormous and long lasting impact on U.S. technology and the national economy.

Economic Impact of the 12GeV Expansion of the Thomas Jefferson National Accelerator Facility and the Technology and Engineering Development Facility (TEDF) Project

Over the course of the period 2006-2015 a **\$241.1 million investment in expanding Jefferson Lab's capabilities** has and will continue to create an additional economic impact for the ...

- **United States** in the amount of **\$760.6 million** in economic output and **4,743 jobs** that will be paid a cumulative total of **\$284.2 million**.
- **Commonwealth of Virginia** in the cumulative amounts of **\$262.3 million** in output and **1,821 jobs** creating labor income in the amount of **\$118.8 million**.
- **Hampton Roads area** in the cumulative amount of **\$164.4 million** in economic output and **1,239 jobs**.

In addition to these direct economic benefits that will flow from the **12GeV** Beam upgrade of the accelerator and the TEDF Project it also will insure that the Thomas Jefferson National Accelerator Facility, already 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 2010**

Table of Contents

EXECUTIVE SUMMARY.....i

Introduction.....1

Economic Impact in the United States2

Economic Impact in Virginia4

Economic Impact in Hampton Roads.....6

Economic Impact of the 12GeV & TEDF Facility Expansion.....8

Economic Impact of the Thomas Jefferson National Accelerator Facility Fiscal Year 2010

Section 1

INTRODUCTION

The purpose of this report is to document 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 2010 (FY 2010)¹. The analysis presented here was developed through the use of the IMPLAN Economic Impact Model, Version 3, to estimate the indirect and induced output of a primary economic entity such as Jefferson Lab. IMPLAN is widely accepted both by professionals and academics as a reliable and accurate model for economic impact analysis. Jefferson Lab currently is undergoing a major expansion and upgrade in its facilities. These projects, in addition to the day-to-day operation of the facility, collectively contribute to the economic impact of the Jefferson Lab entity. They are referred to as the 12GeV Facility Expansion and the construction of the Technology and Engineering Development (TEDF).

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 (3) 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 at the laboratory, these contractors and 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 economic effects from the direct expenditures. Combined, the direct, indirect and induced amounts represent the total economic impact of an entity such as Jefferson Lab. The process starts as Jefferson Lab spends money purchasing equipment from businesses, the direct purchase of output creating income and employment at these firms. In turn, the receiving firms buy inputs and supplies from other businesses. The business-to-business spending is referred to as the indirect income generated. The employees of the businesses that are directly and indirectly affected by these expenditures also spend most of their wages and salaries, creating an induced impact flowing from the JLab spending for equipment and services. The cumulative economic effect of an initial Jefferson Lab expenditure creating indirect and induced expenditures is known as the “multiplier effect.” Taken together, the direct, indirect and induced expenditures sum to the total impact on economic output and employment. The original spending is “multiplied” by the business and consumer demand for goods and services created and supported by the JLab direct expenditures.

Sections 2 – 5 describe the economic output and jobs created by the current JLab facility in FY 2010 for the United States, the Commonwealth of Virginia, and Hampton Roads. Tables are included showing direct, indirect and induced impact by aggregated expenditure categories. Section 5 describes the additional annual average economic impact of the 12GeV Facility Expansion and the construction of the TEDF project are projected to generate over the period 2010 – 2015.

¹ October 1, 2009, to September 30, 2010

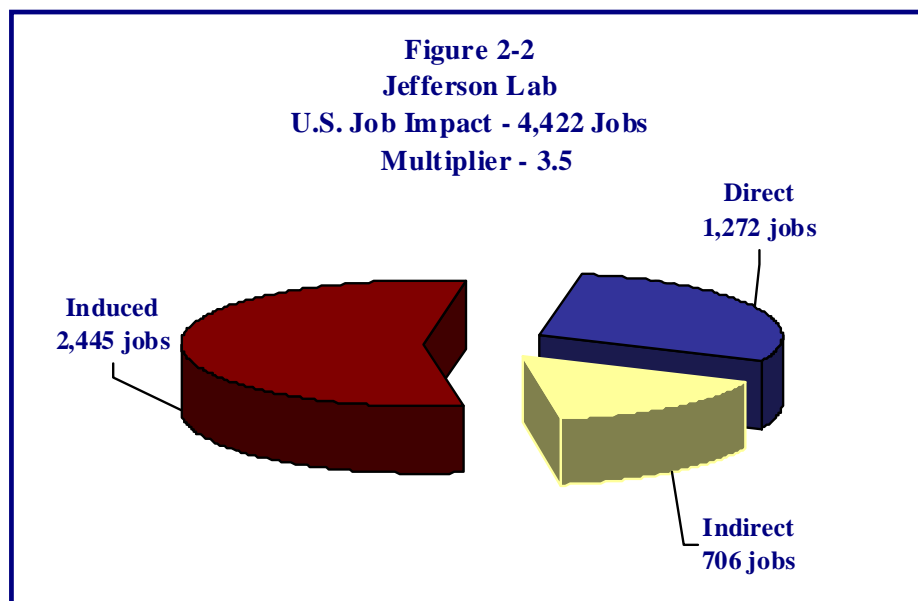
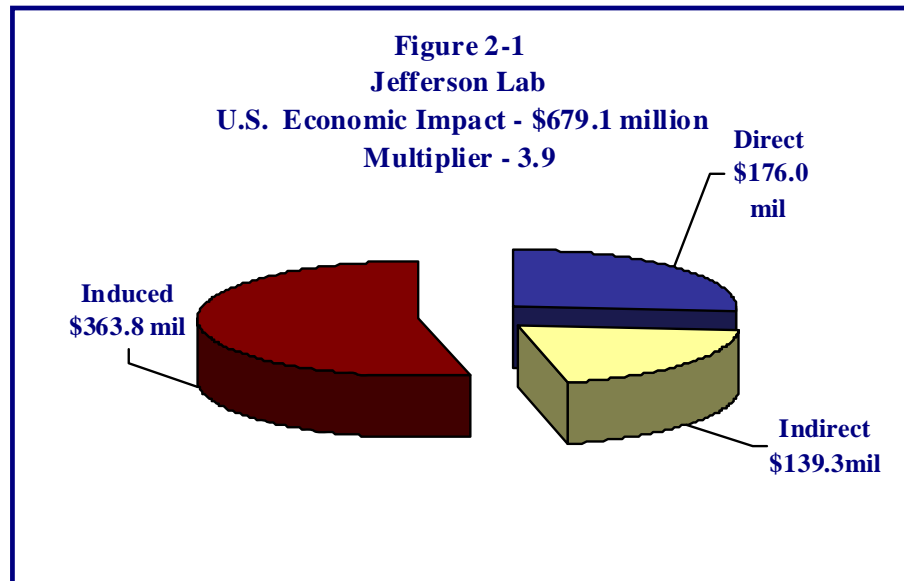
Economic Impact of the Thomas Jefferson National Accelerator Facility Fiscal Year 2010

Section 2

ECONOMIC IMPACT CREATED FOR THE UNITED STATES OF AMERICA IN FISCAL YEAR 2010

In **FY 2010**, the operation of Jefferson Lab produced an economic output of **\$679.1 million** for the nation and generated jobs for **4,422** 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 2010

were **\$176.0 million**. “Indirect” economic output (business-to-business expenditures created by the spending of Jefferson Lab) added another **\$139.3 million** and the induced output (spending of labor income directly and indirectly generated) added still another **\$363.8 million**. Combined, the economic impact of the operation of Jefferson Lab is **\$679.1 million**.



Jefferson Lab, as previously indicated, created **4,422 jobs** for Americans (Figure 2-2). Of these jobs, **1,272** are directly funded by Jefferson Lab either through their employees or through contractors hired to assist the lab. Another **706** jobs are created indirectly through the spending by the facility. The household spending by the workers subsequently induces **2,445 more jobs**.

show a breakout of the U.S. income and job creation by type of expenditure.

Tables 2-1, 2-2 and 2-3

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

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Capital Improvements, Systems Maintenance & repair	\$ 15.8	\$ 12.2	\$ 23.3	\$ 51.3	3.2
Manufactured Goods	44.5	47.8	66.2	158.5	3.6
Information, Education & Training, Transportation & Visitors	7.8	6.4	12.5	26.7	3.4
Utilities & Facilities Services	9.2	3.2	12.6	25.0	2.7
Regular & Temp Personnel, Consultants & Professional Services	98.7	69.7	249.1	417.5	4.2
Total	\$ 176.0	\$ 139.3	\$ 363.8	\$ 679.1	3.9

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

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Capital Improvements, Systems Maintenance & Repair	\$ 5.6	\$ 3.6	\$ 7.6	\$16.8	3.0
Manufactured Goods	10.5	14.3	21.8	46.6	4.4
Information, Education & Training, Transportation & Visitors	2.7	1.9	4.1	8.7	3.2
Utilities & Facilities Services	2.4	0.9	4.3	7.7	3.2
Regular & Temp Personnel, Consultants & Professional Services	81.5	22.7	80.7	184.8	2.3
Total	\$ 102.7	\$ 43.4	\$ 118.5	\$ 264.6	2.6

Table 2-3
U.S. Job Creation – Jefferson Lab
By Expenditure Category
(Jobs)

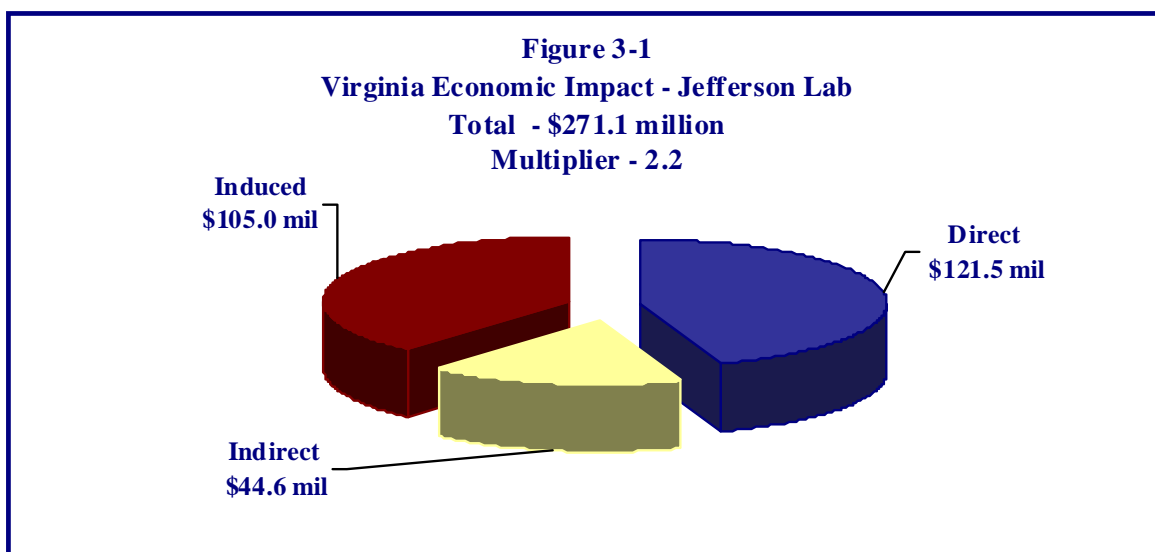
Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Construction, Maintenance & Repair	99	55	157	312	3.1
Manufactured Goods	115	202	448	765	6.6
Information, Education & Training, Transportation & Visitors	61	32	85	177	2.9
Utilities & Facilities Services	35	14	88	137	3.9
Regular & Temp Personnel, Consultants & Professional Services	962	403	1,667	3,032	3.2
Total	1,272	706	2,445	4,422	3.5

Economic Impact of the Thomas Jefferson National Accelerator Facility Fiscal Year 2010

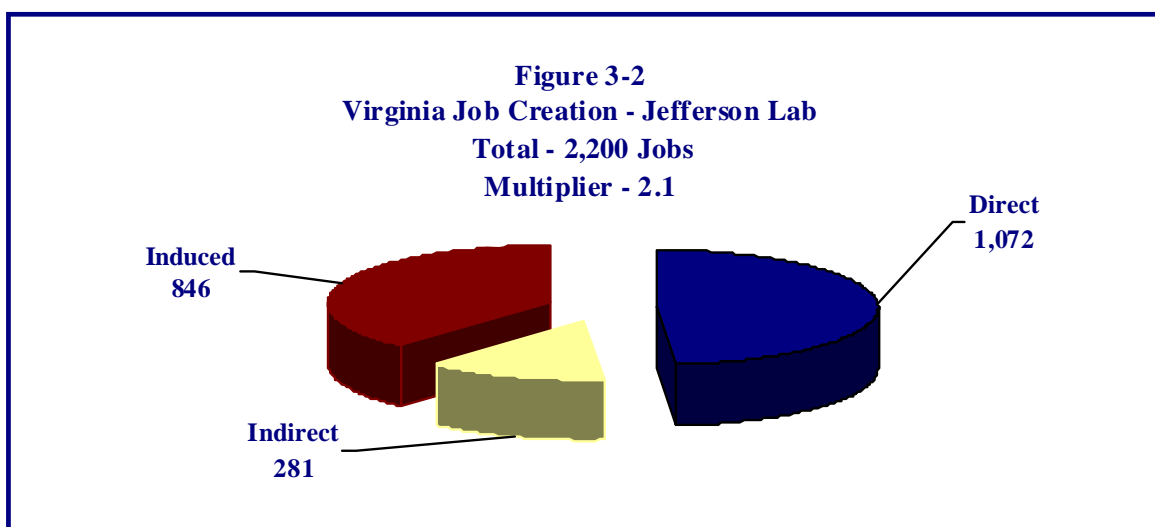
Section 3

ECONOMIC IMPACT CREATED FOR THE COMMONWEALTH OF VIRGINIA IN FISCAL YEAR 2010

For the Commonwealth of Virginia, Jefferson Lab created economic output of **\$271.1 million** (Figure 3-1) together with **2,200 jobs** (Figure 3-2) in FY2010.



The direct expenditures by Jefferson Lab in Virginia of **\$121.5 million** create **\$44.6 million** in indirect economic output and **\$105.0 million** in induced economic output.



Tables 3-1, 3-2 and 3-3 below show detail income and job creation by type of expenditure for the Commonwealth of Virginia.

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

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Capital Improvements, Systems Maintenance & Repair	\$ 14.9	\$ 4.4	\$ 6.8	\$ 26.2	1.8
Manufactured Goods	9.5	3.6	3.4	16.5	1.7
Information, Education & Training, Transportation & Visitors	3.9	1.6	2.3	7.8	2.0
Utilities & Facilities Services	8.7	1.2	4.6	14.6	1.7
Regular & Temp Personnel, Consultants & Professional Services	84.6	33.8	87.7	206.1	2.4
Total	\$ 121.5	\$ 44.6	\$ 105.0	\$ 271.1	2.2

Table 3-2
Commonwealth of Virginia Labor Income Impact – Jefferson Lab
By Expenditure Category
(\$Millions)

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Capital Improvements, Systems Maintenance & Repair	\$ 4.9	\$ 1.6	\$ 2.4	\$ 8.9	1.8
Manufactured Goods	1.8	1.3	1.2	4.3	2.4
Information, Education & Training, Transportation & Visitors	1.5	0.5	0.9	2.8	1.9
Utilities & Facilities Services	2.3	0.4	1.8	4.5	2.0
Regular & Temp Personnel, Consultants & Professional Services	77.4	11.9	30.3	119.5	1.5
Total	\$ 87.8	\$ 15.6	\$ 36.6	\$ 140.1	1.6

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

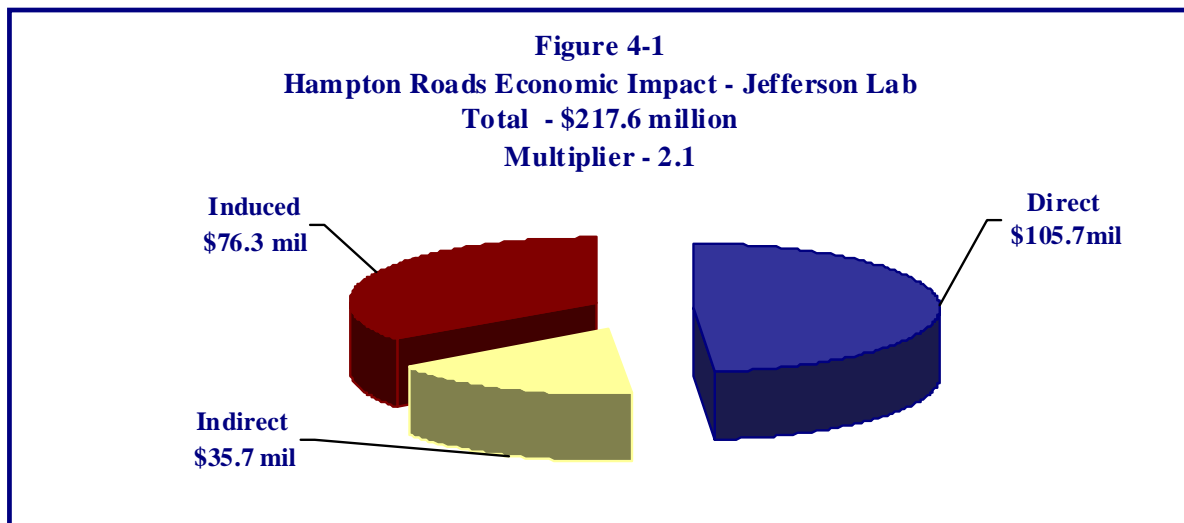
Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Capital Improvements, Systems Maintenance & Repair	95	25	56	176	1.9
Manufactured Goods	28	19	28	76	2.7
Information, Education & Training, Transportation & Visitors	47	9	19	75	1.6
Utilities & Facilities Services	25	7	40	72	2.9
Regular & Temp Personnel, Consultants & Professional Services	877	221	704	1,802	2.1
Total	1,072	281	846	2,200	2.1

Economic Impact of the Thomas Jefferson National Accelerator Facility Fiscal Year 2010

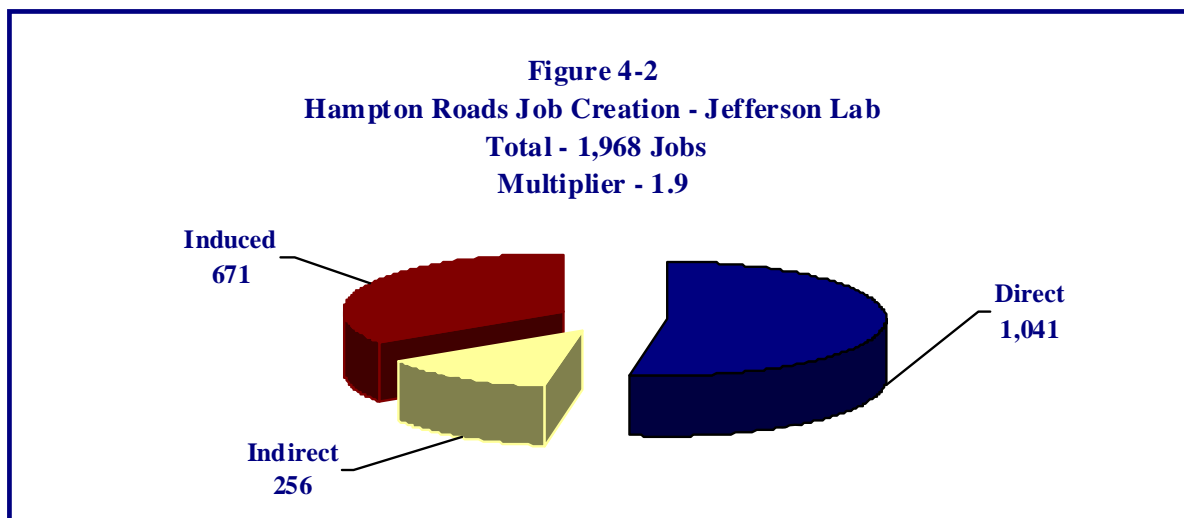
Section 4

ECONOMIC IMPACT CREATED FOR HAMPTON ROADS IN FISCAL YEAR 2010

Jefferson Lab generated a total economic output for **Hampton Roads of \$217.6 million** (Figure 4-1) and **1,968 jobs** (Figure 4-2) in Fiscal Year 2010. Direct expenditures by Jefferson Lab for labor, operating equipment, supplies, and capital improvements in Hampton Roads totaled **\$105.7 million** in FY2010.



Spending by the initial recipient of these direct funds created another **\$35.7 million** in indirect economic output. Subsequent spending of the direct and indirect income earned creates additional rounds of expenditures, the induced economic output, of **\$76.3 million**. Combined, the economic output created for Hampton Roads by Jefferson Lab is **\$217.6 million**.



Tables 4-1, 4-2 and 4-3 show a breakout of the Hampton Roads economic impact, labor income and job creation by type of expenditure.

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

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Capital Improvements, Systems Maintenance & Repair	\$ 13.2	\$ 2.9	\$ 4.5	\$ 20.6	1.6
Manufactured Goods	5.8	1.7	1.8	9.3	1.6
Information, Education & Training, Transportation & Visitors	3.4	1.2	1.6	6.2	1.8
Utilities & Facilities Services	2.1	0.4	1.0	3.5	1.7
Regular & Temp Personnel, Consultants & Professional Services	81.2	29.4	67.4	178.0	2.2
Total	\$ 105.7	\$ 35.7	\$ 76.3	\$ 217.6	2.1

Table 4-2
Hampton Roads Labor Income Impact – Jefferson Lab
By Expenditure Category
(\$Millions)

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Capital Improvements, Systems Maintenance & Repair	\$ 4.2	\$ 1.0	\$ 1.5	\$ 6.7	1.6
Manufactured Goods	1.5	0.5	0.6	2.6	1.8
Information, Education & Training, Transportation & Visitors	1.3	0.3	0.6	2.2	1.7
Utilities & Facilities Services	0.8	0.1	0.4	1.3	1.6
Regular & Temp Personnel, Consultants & Professional Services	75.8	9.5	22.5	107.9	1.4
Total	\$ 83.6	\$ 11.5	\$ 25.6	\$ 120.8	1.4

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.

Table 4-3
Hampton Roads Job Creation – Jefferson Lab
By Expenditure Category
(Jobs)

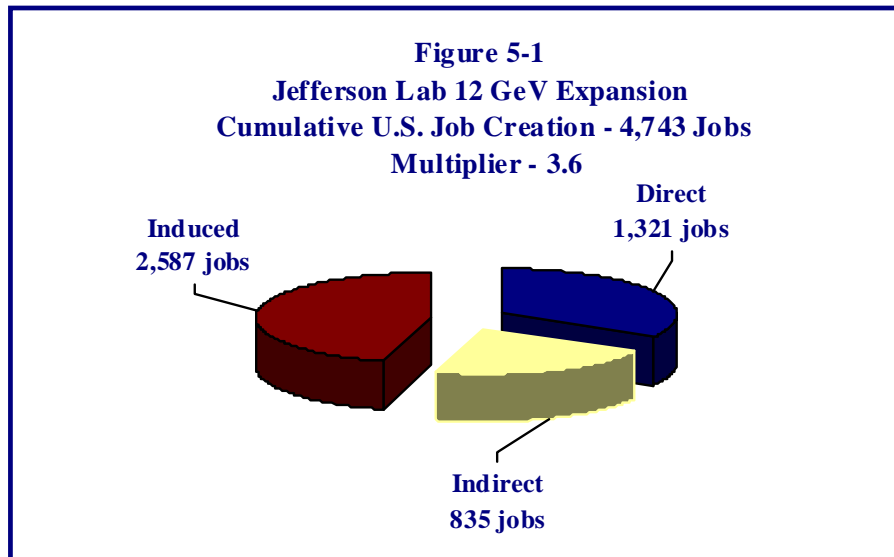
Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Capital Improvements, Systems Maintenance & Repair	86	19	40	145	1.7
Manufactured Goods	24	10	16	50	2.1
Information, Education & Training, Transportation & Visitors	45	7	15	67	1.5
Utilities & Facilities Services	22	3	9	34	1.6
Regular & Temp Personnel, Consultants & Professional Services	865	217	591	1,673	1.9
Total	1,041	256	671	1,968	1.9

Economic Impact of the Thomas Jefferson National Accelerator Facility Fiscal Year 2010

Section 5

ECONOMIC IMPACT OF THE 12GeV FACILITY EXPANSION AND CONSTRUCTION OF THE TECHNOLOGY AND ENGINEERING DEVELOPMENT FACILITY (TEDF)

Cumulatively, the additional economic output that will be generated for the nation over the period FY2006 – 2015 by the doubling of the Jefferson Lab's accelerator capabilities from its current 6GeV to a 12GeV capability and the construction of the TEDF facility will be \$760.6 million and the creation of 4,743 jobs for Americans. These results are shown in Figure 5-1 and Table 5-1 following. Annually over the ten (10) year period, this represents an incremental economic stimulus of \$76.1M for the nation. The effect of the \$ 241.1 million in direct expenditures for the upgrade are 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 4,743 jobs for Americans (Figure 5-1). Of these jobs, 1,321 are directly funded by the expenditures on the Lab's upgrade. Another 835 FTE jobs will be created indirectly through the spending on the facility construction. Another 2,587 jobs will be induced by the economic effects of the direct and indirect expenditures.

Tables 5-1 and 5-2 show the cumulative and annual income and job creation made

possible by the 12GeV expansion for the **United States**.

As stated above, the worldwide direct spending is \$241.1 million. Of this total, the U.S. spending as shown below is \$214.6 million with the balance, \$26.6 million, representing foreign purchases.

Table 5-1
United States Cumulative Economic Impact and Job Creation – Jefferson Lab 12GeV Expansion

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Purchase of Goods and Services (\$ M)	\$ 214.6	\$ 161.1	\$ 385.0	\$ 760.6	3.5
Labor Income (\$M)	\$ 109.1	\$ 49.9	\$ 125.1	\$ 284.2	2.6
Employment	1,321	835	2,587	4,743	3.6

Table 5-2
United States Annual Economic Impact and Job Creation – Jefferson Lab 12GeV Expansion

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Purchase of Goods and Services (\$M)	\$ 21.5	\$ 16.1	\$ 38.5	\$ 76.1	3.5
Labor Income (\$M)	\$ 10.9	\$ 5.0	\$ 12.5	\$ 28.4	2.6
Employment	132	84	259	474	3.6

Tables 5-3 and 5-4 show cumulative and annual income and job creation by the 12 GeV expansion for the Commonwealth of Virginia.

Table 5-3
Commonwealth of Virginia Cumulative Economic Impact and Job Creation – Jefferson Lab 12GeV Expansion

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Purchase of Goods and Services (\$M)	\$ 125.1	\$ 49.4	\$ 87.8	\$ 262.3	2.1
Labor Income (\$M)	\$ 70.8	\$ 17.5	\$ 30.5	\$ 118.8	1.7
Employment	798	316	707	1,8210	2.3

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

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Purchase of Goods and Services (\$M)	\$ 12.5	\$ 4.9	\$ 8.7	\$ 26.3	2.1
Labor Income (\$M)	\$ 7.1	\$ 1.8	\$ 3.0	\$ 11.9	1.7
Employment	80	32	71	182	2.3

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 Economic Impact and Job Creation – Jefferson Lab 12GeV Expansion
By Expenditure Category
(\$Millions)

Expenditure Category	Direct	Indirect	Induced	Total	Multiplier
Purchase of Goods and Services (\$M)	\$ 87.7	\$ 30.6	\$ 46.0	\$ 164.4	1.9
Labor Income (\$M)	\$ 46.3	\$ 10.0	\$ 15.5	\$ 71.8	1.6
Employment	611	222	406	1,239	2.0

Table 5-6
Hampton Roads Annual Economic Impact 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)	\$ 8.8	\$ 3.1	\$ 4.6	\$ 16.4	1.9
Compensation (\$M)	\$ 4.6	\$ 1.0	\$ 1.6	\$ 7.1	1.6
Employment	61	22	41	124	2.0

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.